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A SYSTEM OF

OBSTETRICS

WITH FIVE HUNDRED AND FORTY-THREE ILLUSTRATIONS
BASED UPON A TRANSLATION FROM THE FRENCH

DR. A. AUVARD
Accoucheur to the Hospital of Paris

REVISED FROM THE THIRD EDITION BY
JOHN DAVIS HARTLEY, M. D.

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TREATISE ON OBSTETRICS.

CHAPTER I.

MENSTRUATION AND FECUNDATION.

Woman's life is divided into three great periods: one, prægenital; another, genital; the third, post-genital. The first extends from birth to the first menstruation; the second, from puberty to the menopause, and the last, from the menopause to the close of life.

Only the genital period interests the obstetrician, for it is that portion of woman's life that is consecrated to procreation. In imposing this role upon woman, nature has established in her a preponderance of the genital system, an idea that Michelet has so well expressed in the words, "Woman is a matrix supplied with organs."

This genital system, which dominates the feminine organism, imposes three different states, that successively divide the genital period. For a time there is repose, calm, an intermittent and a regular truce accorded to the economy. Then there is the preparation for fecundation, the period of emission of the ovule, the menstrual state. Sometimes, finally, after the meeting and the union of the two elements, male and female, a being developes in the interior of the uterus, and causes in the gestating woman a series of changes necessary to ensure this new life; this epoch is designated as the puerperal state. Thus, a state of repose, a menstrual state and a puerperal state occur during the genital life of woman. It is the puerperal state that especially interests the obstetrician. Obstetrics is the study of the puerperal state, provided this term is used to designate the period which extends from impregnation to the end of lactation, or to the end of the third month after delivery when the mother does not nurse her child.

Before entering upon the study of pregnancy it will be necessary to consider briefly menstruation and fecundation, which are its preliminaries to pregnancy. The term menstruation is applied to the flow of blood, which occurs periodically from the female genital organs. Menstruation comprises two essential phenomena, ovulation and a sanguineous flow. Each demands a special study.

Ovulation is the liberation by the ovary of a cell, having an important future and to which has been given the name ovule.

A word on the ovary and its contents. The ovary, situated in the posterior wing of the broad ligament, is a small gland resembling an almond in form. It measures four centimetres in length, two in height and one centimetre and a half in its antero-posterior thickness; its weight is eight grammes. Its two surfaces and its superior border being free it floats in the peritonæal cavity. Its inferior border is attached by a ligament to the uterus and to the pavilion of the tube by one of its fimbriæ. I shall return to the anatomical relations of the ovary in connection with the subject of fecundation.

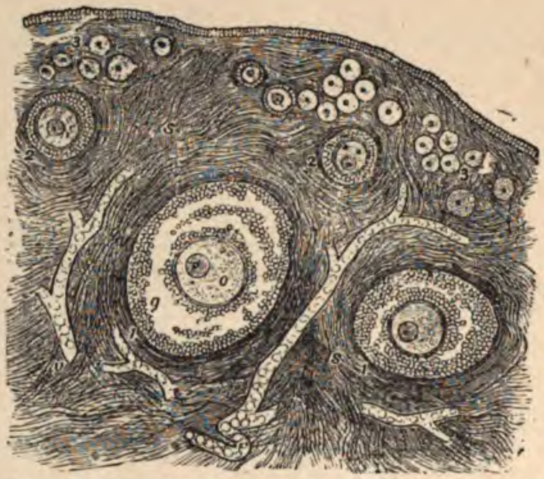


FIG. 1.—Section of a fragment of the ovary. *SS*, ovarian stroma: *e*, epithelium; 1 1, Graafian follicles highly developed; 2 2, non-developed follicles; 3, very small follicles; *O*, ovule in the Graafian follicle; *v v*, bloodvessels; 9, cells of the granular membrane.

On section, the structure of the ovary is found of a reddish color, rose colored in some parts, a deeper red in others. This is the bulbus portion, a mixture of non-striated mucular fibres, connective tissue fibres, arteries, veins, lymphatics and some nerve filaments. This bulbus portion forms almost the whole of the ovary. It is covered by a thin envelope, which scarcely measures a millimetre in thickness.

The peripheral portion, called the fibrous tunic by the older writers, is distinguished from the subjacent portion by its pale color, its apparent homogeneousness and by its firmness. This envelope is the fundamental portion of the ovary. It is formed by the accumulation of ovisacs, also called ovarian vesicles or Graafian follicles. It is in the interior of these vesicles that the ovule is found.

Contrary to what is observed in all the other glands of the organism, the ovary has its cavity at the surface and it is there that the phenomenon of ovulation takes place. To comprehend the phenomenon a complete description of the ovisac and its contents is indispensable. The follicle contains an accumulation of other cells, among them one of particular character, the ovule. The ovule is the female primordial element, just as the spermatozoid is the primordial element of the male. The ovule is constituted by the germinative spot, the germinative vesicle, the vitellus and vitelline membrane. The ovule is contained in the interior of the ovarian vesicle surrounded by cells, the whole being enveloped in a common membrane. Altogether these structures form the ovisac. In its conformation the ovule does not differ from ordinary cells. Each ovisac contains an ovule, and each ovary contains, as M. Sappey has demonstrated, approximately 300,000 ovisac, or 600,000 to each woman.

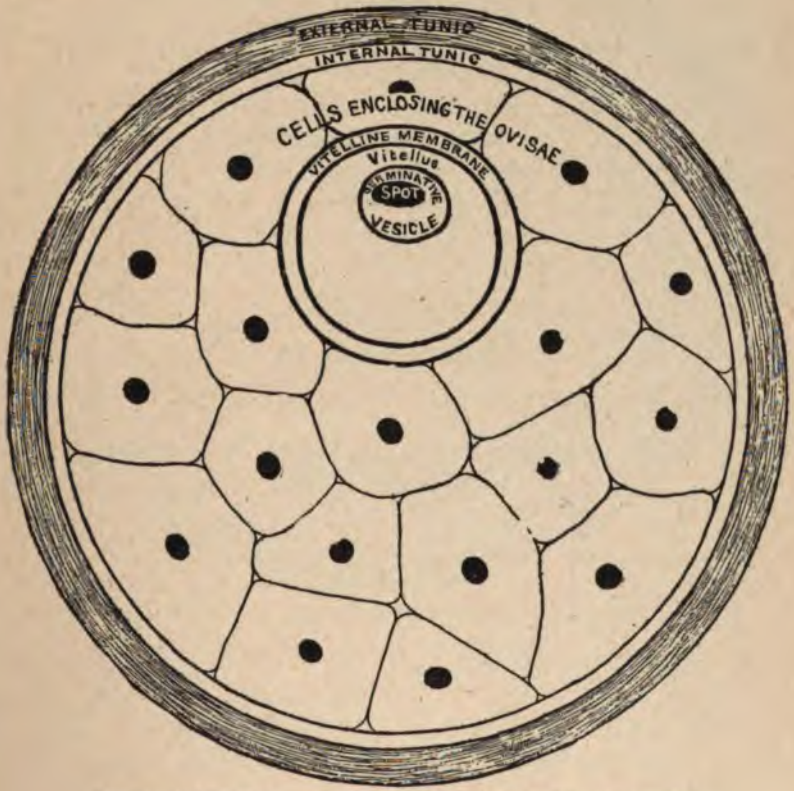


FIG. 2.—Schematic representation of the Graafian follicle or ovisac and of its contents, the ovule.

Let us follow an ovisac in its menstrual evolution. In its interior the cells assume proliferation and at one point a cavity is formed, that fills with liquid, perhaps the result of the cellular activity. The vesicle enlarges markedly under the influence of the cell proliferation and of the accumulation of liquid. It takes on a size that becomes visible to the naked eye at the surface of the ovary.

This swelling continues and the vesicle, instead of remaining spherical, takes an ovular form, with the small extremity corresponding to the free surface of the ovary. At the moment when the distention becomes too great, rupture occurs at the most projecting point. This rupture, prepared for by the modifications in the ovisac, is provoked by the congestion of the bulbus portion of the ovary. This congestion occurs under the influence of menstruation or any genital excitation, such as that produced by coitus.

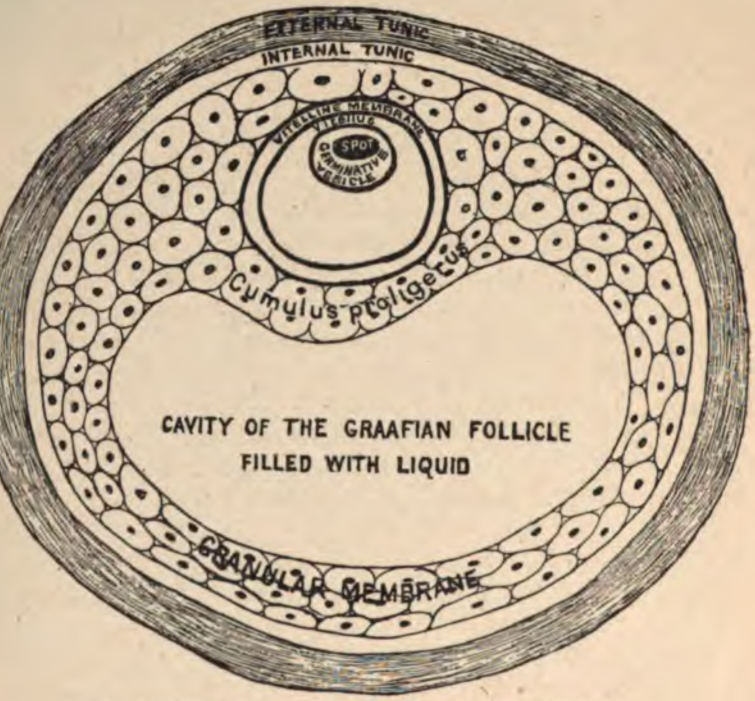


FIG. 3.—Ovisac preparing to rupture and liberate the ovule.

At the moment of dehiscence the ovule is thrown outward. The ovisac, abandoned by the ovary, becomes henceforth useless. Its role is completed. Blood and plastic lymph are effused into its interior. The place of rupture which has given passage to the ovule cicatrizes. The vesicle becomes folded on itself. From the transformations of its contents it takes on the appearance of the *corpus luteum*, disappearing by degrees until reduced to a linear or radiate cicatrix that is more or less depressed. The corpus luteum of menstruation differs from that of pregnancy only by the fact that the latter, under the influence of the activity impressed on all the genital zone by fecundation, instead of diminishing, enlarges for two or three months and does not undergo regression until after delivery. Thus we understand the phenomena of ovulation, there now remains to be studied the other condition of menstruation, that is, the flow of blood.

The periodical hæmorrhage that occurs during the genital life of woman generally begins, in France, at fifteen years of age and terminates at forty-five. Thus it may be said that the genital life continues about thirty years. But there are observed frequent variations in the period of appearance and of cessation of the menses, variations which depend upon the constitution, upon the temperament, upon the geographical latitude of the country, upon the education, upon the habitual diet, upon the race and upon the social condition of the woman. Various facts of precocious and of late menstruation have been cited. The menstrual flow is reproduced in general every solar month (thirty to thirty-one days), sometimes oftener; every lunar month (twenty-eight days), and some women menstruate even every three weeks, others only every five weeks. Finally, there are some in whom the appearance of the flow is capricious and irregular. The duration of the flow is commonly from three to six days. Some women only menstruate a few hours, others from ten to twelve days. I only give the extreme figures. It is difficult to appreciate the quantity of blood lost at each menstrual period, but a quantity less than fifty grammes or greater than five hundred grammes may be considered as pathological.

The blood which flows during the menstrual period has its source in the tubes and in the body of the uterus, rarely in some other portion of the genital organs. Exceptionally the flow may occur from another region, in such cases as have been called menstrual deviation, where the periodical hæmorrhage takes place from the lungs, from the intestine, from the mouth, from the nose, from the surface of a wound, from an erectile tumor or from the nipple.

I return to the *uterus*. At each menstruation the uterine mucosa is folded on itself in such a way as to recall the cerebral convolutions. This tumefaction, the consequence of the genital congestion, favors the implantation of the fecundated ovule, which thus becomes grafted on the folds of the mucosa. The mucosa also undergoes other modifications, about which there are so many different opinions that it is impossible to judge of their true nature.

Having sufficiently discussed the two essential phenomena of menstruation, there remains the study of their relations. Does the flow of blood depend upon ovulation? Or, on the contrary, does ovulation depend upon the blood-flow? Or, a third hypothesis, are these two factors independent? Each of these theories has its partisans. Without wishing to enter here into a complete discussion of this difficult question, I shall say that I believe in a certain degree of independence of ovulation and menstruation. I also believe that they are subordinate, one to the other, in such a way that they most often occur together. It is the union of ovulation and of menstruation that constitutes menstruation, as the current of air and the contraction of the vocal cords forms the voice. Now there is the same union and the same independence existing between the current of air and the contraction of the vocal cords, as between ovulation and the flow of blood. Ovulation is the essential phenomenon of menstruation and the sanguineous flow the accessory element. One assures fecundation, the other preparation for it. Their union place the woman in the most favorable condition for conception. From this study of menstruation we pass to that of fecundation or conception.

Fecundation is the union of two elements, male and female, in the aim of procreation of a new being. Conception is the synonym of fecundation, and only differs from it by a simple shade of meaning; fecundation indicating the union of the two procreative elements, and conception applying better to the state of the woman who has just been fecundated. We have spoken of one element, the ovule. We shall now turn to the spermatozoid.

The spermatozoid, wrongly called spermatozoon at the time it was considered animalcule, is composed of a head of ovular form, measuring 5 mm. in its long axis, of a small cylindrical body offering almost the same length, and finally an undulating tail which grows successively thinner toward its extremity, and has a length of 45 mm. From the recent studies on the development and the nature of the spermatozoid, it has been proven that it is only a cell of a particular form, the nucleus being represented by the head and the protoplasm by the intermediate segment. The tail is only a simple cilium analogous to that met in other cells of the economy. Under the microscope, in a drop of fresh spermatic fluid, spermatozoids are seen in great number, moving with great rapidity. These displacements are due to a corkscrew movement of the cilium which constitutes the tail of the anatomical element. In a second a spermatozoid covers its length; it moves at the rate of two to three millimetres a minute. These movements quickly cease as soon as the spermatozoid is placed in an acid medium instead of the alkaline fluid in which it normally occurs. The uterine fluid being alkaline, and likewise that of the tube, the spermatozoid preserves its movements therein for a certain length of time, to fifteen days, according to Schroeder, and perhaps even more. But if there is endometritis, the uterine secretion becomes acid and the spermatozoid is quickly killed.

The two elements, male and female, now being understood, we may essay the solution of the problem of fecundation, and to this end we shall note successively: The place of the meeting of these two elements; the approach of these elements, one toward the other; the difficulties that they must overcome before union.

At the moment of ovular dehiscence the ovule becomes free at the surface of the ovary, the spermatozoid, for the other part, is deposited at the external orifice of the uterus as a consequence of coitus. To meet, the ovule and the spermatozoid must travel through the uterus and the tube. But the approach of these elements toward each other can only be comprehended by a previous study of the parts through which they must pass. We turn, then, to the cavities of the uterus and of the tubes.

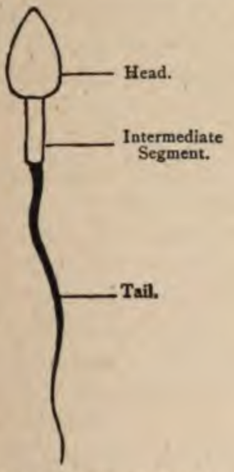


FIG. 4.—Spermatozoid.

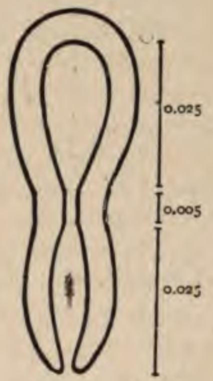


FIG. 5.—Uterus: body; isthmus; cervix.

The uterine cavity is subdivided into that of the body and that of the cervix, which are separated by a short canal, the isthmus (Fig. 5). Each of these cavities measure about two and one-half centimetres vertically, though in the nulliparous woman the cavity of the cervix exceeds that of the body, and, on the contrary, in the multiparous woman that of the body is relatively greater. The cavity of the body has a triangular aspect, the superior angles being continuous with the tubes, and the inferior with the isthmus. The surfaces are plane and applied one to the other in such a way that the space is virtual or is filled in the normal state with a small quantity of mucus.

The cavity of the cervix is fusiform, slightly flattened from before backward. The mucosa that lines its walls is uplifted by the *arbor vitæ*, two in number. Each one of these structures is composed of a longitudinal axis, from which arise transverve and ascending branches. The anterior axis begins at the external orifice and is directed obliquely above and to the right; the posterior axis, placed symmetrically to the origin of the former, followes an oblique path in an analogous direction, that is to the left and toward the internal orifice. The two axes terminate by gradual diminution toward the isthmus, no branches existing at that place. The utility of the arbor vitæ is unknown, but it is supposed that they favor the passage of the spermatozoids.

The uterine cavity is lined by a mucosa, of one to two millimetres in thickness, continuous above with that of the tube and below with that of the cervix. In the cervical cavity the epithelium is calciform, and is continued into the interior of the numerous racemose glands of this region. At the summit of the projections of the arbor vitæ the epithelium becomes cylindrical and possesses cilia. In the isthmus and in the cavity of the body of the uterus, there is found cylindrical epithelium with cilia, that is prolonged into the interior of the tubular glands (with the exclusion of the cilia), the only variety contained in this region.

The tube or oviduct is the canal that establishes communication between the surface of the ovary and the uterine cavity. When the abdominal cavity is opened, and the intestines are removed, there will be seen on each side of the uterus two transverse folds. These are the broad ligaments, the free or the superior border of which is divided into three wings. The anterior contains the round ligament, the median contains the tube, and the posterior is reserved for the ovary and its ligaments, to the number of two, one attaching it to the uterus (ligament of the ovary), the other to the tube (ligament of the tube).

The tube presents an average length of twelve centimetres. Departing from the supero-lateral angle of the uterus it takes a slightly tortuous course toward the lateral wall of the pelvis, terminating a short distance from this wall by expanding into a fringed and mobile pavilion. In the vicinity of the uterus the diameter of the tube is about one millimetre, and this increases more and more toward the pavilion. Its structure comprises a superficial, incomplete, serous envelope; a non-striated muscular tunic, composed of a superficial longitudinal layer and a deep circular; finally, the mucosa, which presents numerous longitudinal folds (Fig. 6). The epithelium which lines its cavity has cilia, as in the uterus, and at the free border of the tube it becomes directly continuous with the flattened epithelium of the peritonæum. This description is sufficient to give us a succinct idea of the canal, which extends from the ovary to the external orifice of the uterus, and which the two elements, male and female, follow in their approach toward each other.

But a preliminary question occurs here, that of knowing at what place the meeting of the spermatozoid and ovule usually takes place. If it is possible to determine this point, we know in advance the path taken by each of these elements. It has been shown from the experiments of Bischoff and of Nuck, on bitches, that the meeting takes place in the external third of the tube. Coste admits the same for the human female; he also believes that if the meeting takes place nearer the uterus fecundation is not possible, for in penetrating thus far the ovule becomes so coated with albumen as to become impermeable.

Let us take the ovule at the surface of the ovary and the spermatozoid at the entrance of the uterus, and follow these elements to the point of meeting, in the external third of the tube, studying their mode of progression.

We have four theories: One, of the progression of the spermatozoid by capillary action (Coste, hoiegeois); one, as to the action of the vibratile cilia (Muller); another, as to the movement of aspiration made by the uterus at the end of coition (Riolan, Morgan), and a fourth, a supposition that the spermatozoids are capable of independent migration by virtue of the rapid progression revealed under the microscope. Thus we are in the presence of four theories that render quite plain the progress of the spermatozoid. It has been objected that ciliated cells do not exist in the whole extent of the genital organs; that aspiration cannot be exerted in a cancerous uterus; that in certain animals fecundation is possible although the spermatozoids are not mobile. These are simple objections of detail which show us that one of these causes may be deficient or absent without impeding fecundation. It appears rational to admit that capillary action, the vibratile cilia, uterine aspiration and the movements of the spermatozoids are conjoined in aiding the progress of the male element in the interior of the female genital organs. All these theories are true in part, but no one of them should be admitted to the exclusion of the rest.

With regard to the ovule, the problem to be solved is the manner in which it passes from the surface of the ovary to the external third of the tube. The distance is short and yet the difficulty is great, for the route is not continuous. The surface of the ovary, like the pavilion of the tube, floats in the great peritonæal cavity. The ovule then passes from one to the other, much as a projectile is thrown from one point to another in the atmosphere. Attempts have been made to explain this migration in five different ways: 1. Heller and Rouget believe that, at the moment of dehiscence of an ovisac, the pavilion of the tube, free in the usual state, applies itself on the ovary and exactly encloses it. The ovule is thus engrossed and gathered into the tube at its issue from the ovisac. 2. Kehrer advances the theory of the projection of the ovule into the pavilion of the tube by an impulse given it from the bursting of the Graaffian follicle. I do not believe in this fantastic theory. 3. The ligament which unites the ovary to the pavilion is slightly hollowed out on its upper surface in the form of a trough; Henle interprets this anatomical disposition by giving us the opinion that the ovule follows this from the ovary to the tube. 4. But little satisfied with the explanations given, and discouraged in his vain researches, Kiwisch has advanced the idea that the migration of the ovule is accidental. The peritonæum thus becomes the tomb of useless ovules. 5. I arrive at the theory of the *menstrual lake*, that I have reserved for the end, as it appears the most adapted to explain the migration of the ovule.

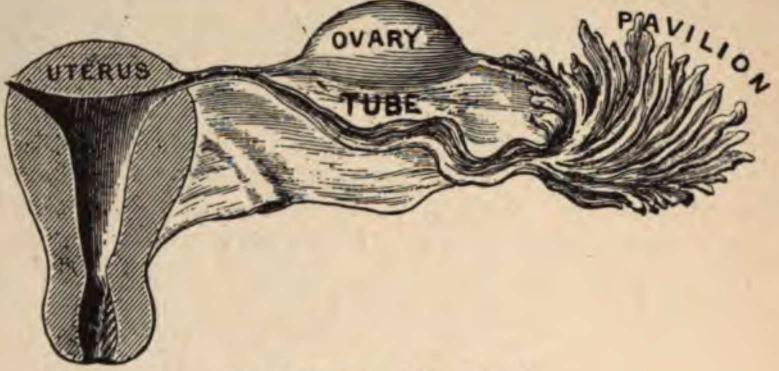


FIG. 6.—Uterus. Tube. Ovary.

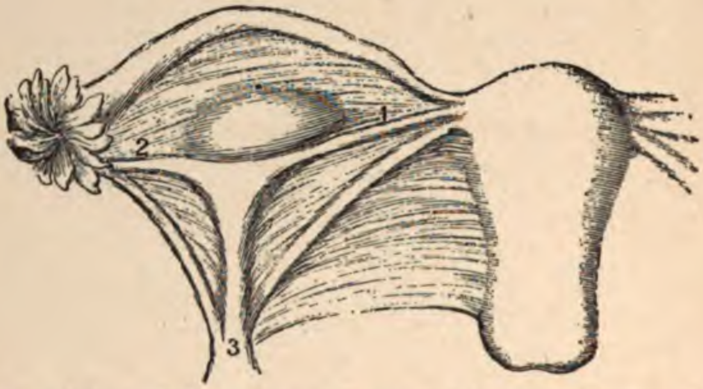


FIG. 7.—Posterior round ligament. 1, ligament of the ovary; 2, ligament of the tube; 3, posterior round ligament, with the three branches external, median, internal.

According to Becker, at the moment of dehicence there occurs around the ovary an accumulation of serum and liquid blood which constitutes a veritable lake. When the ovule leaves the ovisac it floats on this fluid, which, being diverted by the tube into the uterus draws the ovule with it into the genital canal. But an objection arises at once. If this current draws the ovule from the ovary toward the vulva, how can the spermatozoid, placed under the same influence, pursue a contrary direction? I shall remark that the spermatozoid is generally deposited in the feminine genital organs before or after the flow, and that it gains the external third of the tube without undergoing the influence of this current. I know that some conceptions only take place on condition of a coitus during the menstrual period. But these exceptions may be explained by admitting that the spermatic fluid, from its special consistence, remains adherent to the uterine mucosa, or even to the vaginal, and that it accomplishes fecundation after cessation of the menstrual flow. We might also suppose that by the action of the vibratile cilia and the movements of the spermatozoids, the male element is capable of overcoming the sero-sanguineous current to arrive at the ovule.

The ovule and the spermatozoid having met in the external third of the tube, fecundation occurs, the woman has conceived and pregnancy commences. We are now to study all the transformations of this fecundated ovule, which becomes the embryo, and then the fœtus, and all the modifications affecting the material organism under this influence.

CHAPTER II.

DEVELOPMENT AND DESCRIPTION OF THE HUMAN OVUM.*

The fecundated ovule in the external third of the tube continues in its course toward the cavity of the body of the uterus, where it arrives in a few days, and where it becomes fixed and develops during the nine months of pregnancy. During this passage the ovule begins its transformation and continues in development after its arrival in the uterus. The modifications to be disclosed begin, then, in the tube, and are achieved after fixation in the uterine cavity. In studying fecundation, we left the ovule surrounded by spermatozoids. We will then take up the description at the same point. The first transformations to which fecundation gives rise are:

1. The formation of the male nucleus.
2. The fusion of the two nuclei, male and female.
3. Segmentation.
4. The formation of somatopleures and of splanchnopleures.

1. *Formation of the male nucleus.*—Spermatozoids in variable number surround the ovule and attempt to penetrate the vitelline

---

* I omit some modifications of the ovule previous to fecundation (formation of the amphiaster, emission of polar globules), which are of secondary importance.

membrane in the endeavor to traverse the vitellus to the germinative spot, which is only the nucleus of the ovule, represented in Fig. 8 by the central black spot. One of these spermatozoids, either because it is endowed with a particular vigor, or because it finds a thin and relatively weak point in the vitelline envelope, buries itself in the surface of the ovule. At its approach the vitellus form a projection to meet it, as if to invite it to enter, and draws it toward the centre. To this momentary projection of the vitellus has been given the name "cone of attraction." The spermatozoid, as indicated in Fig. 9, which represents the successive steps of the penetration, continues to approach the center. Soon the head becomes detached from the intermediary segment and from the tail, the role of which is terminated and which quickly disappear. In the interior of the ovule there are now found two nuclei (Fig. 10); one, the larger, is the germinative vesicle—the female nucleus of the ovule; the other, placed between the preceding and the vitelline membrane, is the male nucleus, the former head of the spermatozoid.

2. *Fusion of the two nuclei.*—The male nucleus becomes surrounded by a series of small rays which cover all its surface like bristles (Fig. 11). Continuing its concentric progress, this nucleus arrives in contact with the female nucleus (Fig. 12), with which it becomes fused little by little, furnishing a series of appearances which recall, somewhat, two stars passing over the other as in eclipse. In Figure 13 the eclipse is total, the fusion of the two nuclei complete. The ovule presents the same details as before fecundation, the vitelline membrane, the vitellus, the germinative vesicle or nucleus, in which exists the germinative spot or nucleolius. But the male nucleus, essentially active, has been added to the female nucleus, which passively awaited it, and has imparted to the ovule a new vitality, the effects of which are quickly perceived.

3. *Segmentation.*—The ovular nucleus is seen to divide and give birth within the vitelline membrane to two distinct cells (Fig. 14). The segmentation continues, in place of two cells, four appear (Fig. 15). Finally, by a series of analogous divisions (Fig. 16) a great number of cells accumulate in the interior of the ovule, contained within the vitelline membrane. We are now at about the eighth day consecutive to fecundation.

4. *Formation of somatopleures and splanchnopleures.*—In the center of this agglomeration of cells is formed a small collection of liquid which by its progressive augmentation pushes back the cells eccentrically and packs them into the vicinity of the vitelline wall (Fig. 17). All these cells, which as a whole constitute the blastoderm, are divided into three distinct layers (Fig. 18). The external, or ectoderm; the middle, or mesoderm, and internal, or

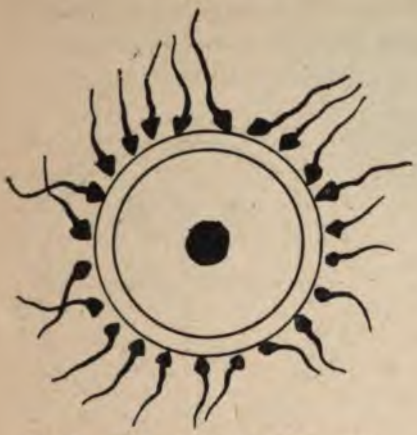


FIG. 8.—Meeting of the spermatozoids and the ovule.

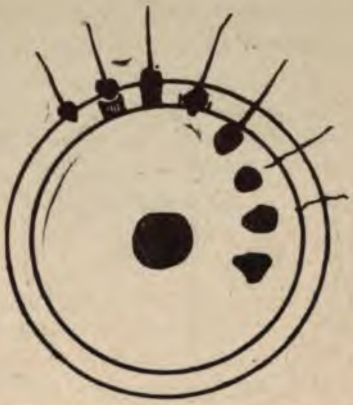


FIG. 9.—Penetration of the spermatozoid.

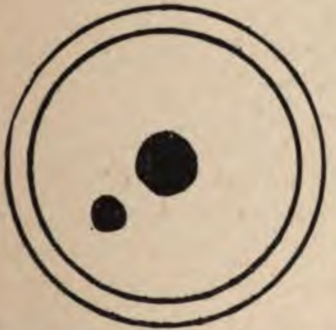


FIG. 10.—Ovule, with its two nuclei, male and female.

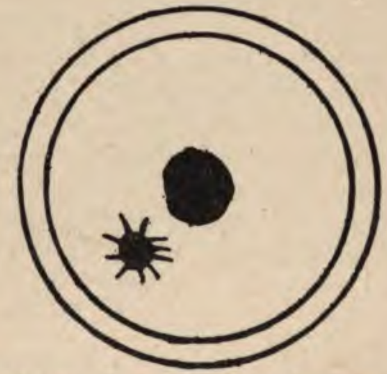


FIG. 11.—Radiations of the male nucleus.

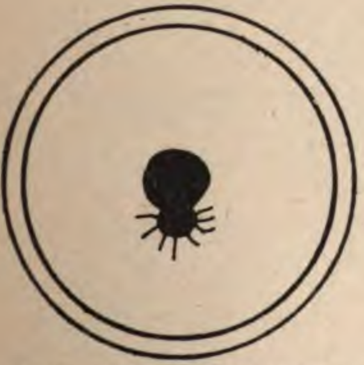


FIG. 12.—Approach of the two nuclei.

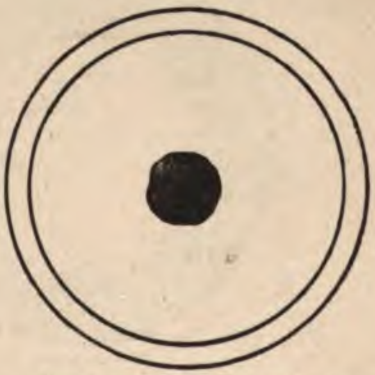


FIG. 13.—Fusion of the two nuclei.

endoderm. The three layers, external, middle and internal, of the blastoderm are also called epiblast, mesoblast and hypoblast respectively.

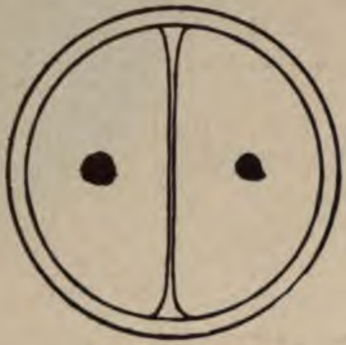


FIG. 14.—Segmentation.

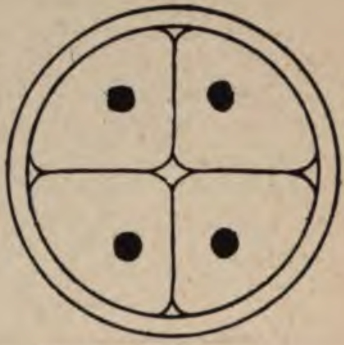


FIG. 15.—Segmentation.

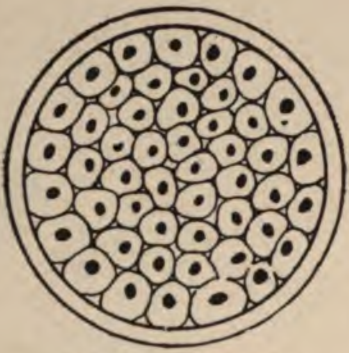


FIG. 16.—Segmentation.

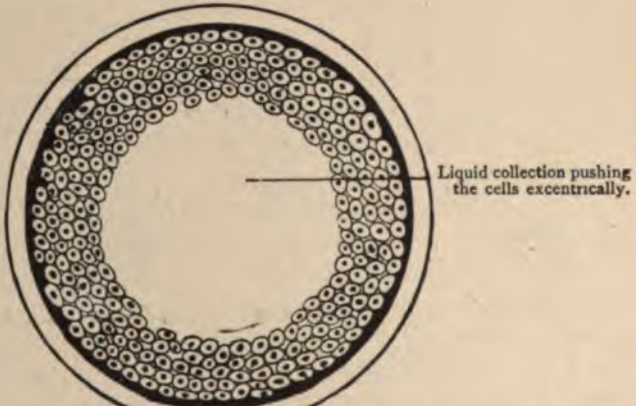


FIG. 17.—Peripheral accumulation of the cells.

This division does not take place posteriorly, where the cells remain packed together, and there they soon are separated by a canal, which becomes the medullary canal, and by a thickening, circular on section, called the dorsal cord or the notochord, which forms the bodies of the vertebræ, that is, the most resistant part of the vertebral column. The section of this dorsal chord and medullary canal can be seen in Fig. 19.

The same illustration indicates a new transformation of the ovule· The mesoderm, or the middle layer of the blastoderm, is separated into two rows of cells, the external adhering to the ectoderm and the internal to the endoderm. By this separation the three layers now form only two:

An external, called the somatopleure.

An internal, called the splanchnopleure. The somatopleure forms the envelope and the framework of the body, the splanchnopleure, the viscera.

To facilitate the comprehension of the preceding illustration, the two layers, formed by cells composing the splanchnopleure and the somatopleure, will be represented by a unique character as shown in Fig. 20, which is otherwise identical with Fig. 19.

These two layers are blended behind in a common mass in which is perceived the dorsal cord and the medullary canal. The somatopleure and the splanchnopleure, which were disposed in a circular manner (Fig. 20), next undergo a strangulation in their middle portion as indicated in Fig. 21. This strangulation divides these two membranes into two distinct regions:

One, *embryonic* (inferior, Fig. 21).

The other, *extra-embryonic* (superior).

The embryonic portion is united to the extra-embryonic by the intermediate or constricted region. Now these three parts have, in the ulterior development of the ovum, different roles to fulfill.

The extra-embryonic part will form the envelopes of the ovum and the placenta.

The intermediate part will form the cord.

The embryonic part will form the fœtus.

Let us study successively the development of each of these parts and their constitution after complete formation.

I. **Extra-embryonic portion of the ovum.**—*Membranes.—Placenta.—Amniotic liquor.*—The extra-embryonic part of the ovum is formed, as we have seen in Fig. 21, by the extra-embryonic somatopleure and splanchnopleure, separated by a virtual space called the external cœlum (the internal cœlum is an analogous space found at the embryonic part). The real cavity formed by the extra-embryonic splanchnopleure is called the umbilical vesicle and contains the elements for the nutrition of the ovum until the formation of the placenta. This umbilical vesicle corresponds, as to its contents, to the yolk of the eggs of birds. While the wall of the umbilical vesicle, formed by the splanchnopleure, undergoes an atrophy and a progressive retreat, the suprajacent layer, on the contrary, which is only the extra-embryonic somatopleure, takes on a considerable and rapid development to constitute the secondary chorion and the amnion. The layer of the somatopleure, is seen to throw out a series of prolongations, indicated by the successive tracings 1, 2, 3, 4 (Fig. 22). These prolongations meet one another by surrounding the ovule; their reunion quickly occurs at a point opposite to their origin. When this reunion is achieved (Fig. 23), i. e., of the two layers created by this prolongation, one is directly applied to the internal surface of the vitelline membrane over all its extent; the other, continuing with the intermediate somatopleure, lines a part of the external surface of the umbilical and of the internal surface of the preceding layer; while between them and the embryo exists an actual cavity in which is collected the amniotic fluid.

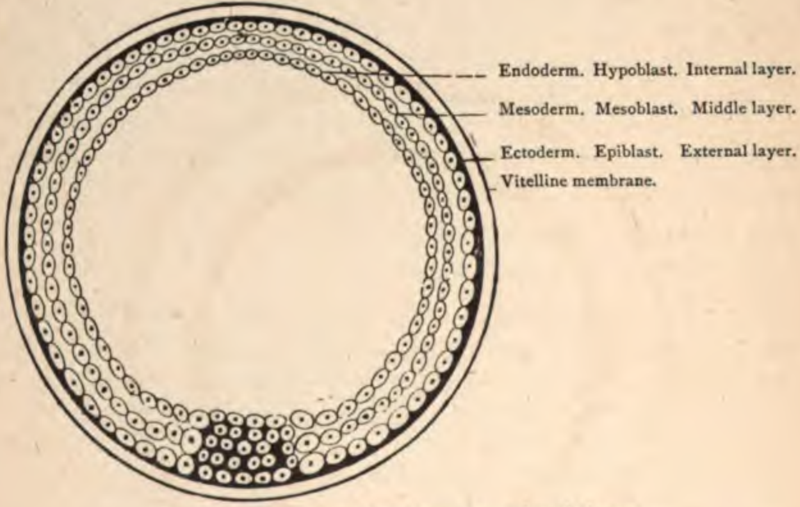

Endoderm. Hypoblast. Internal layer.
Mesoderm. Mesoblast. Middle layer.
Ectoderm. Epiblast. External layer.
Vitelline membrane.

FIG. 18.—Formation of the three blastodermic layers.

The primary chorion is formed by the vitelline membrane, the surface of which is covered at a certain time with villi. The secondary chorion is created by the addition of the layer of the extra-embryonal somatopleure to the vitelline membrane. These two membranes undergo a true fusion to form the secondary chorion. The membrane which, in Fig. 23, is found under the secondary chorion, is the amnion. In the space which separates them is developed the definitive chorion, as we shall see.

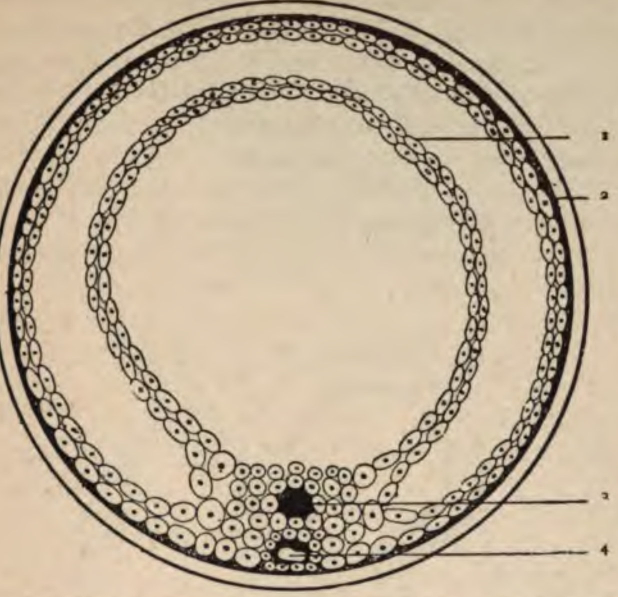


FIG. 19.—Formation of somatopleure and splanchnopleure. 1, splanchnopleure; 2, somatopleure; 3, dorsal cord; 4, medullary canal.

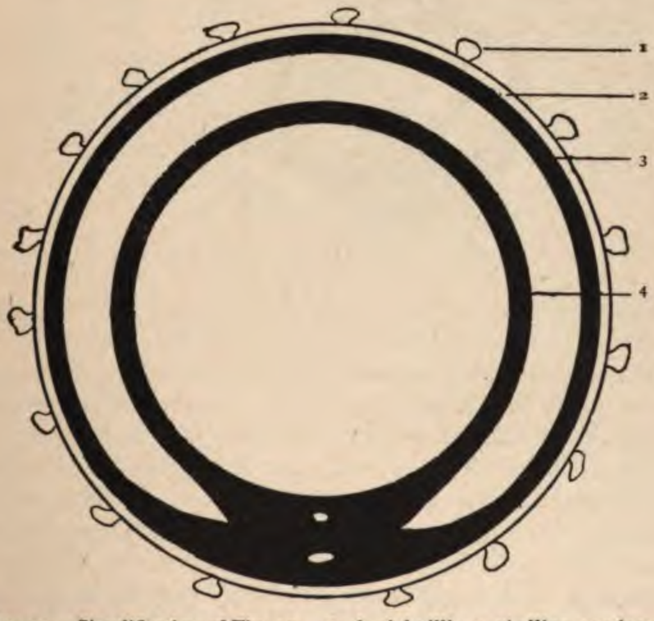


FIG. 20.—Simplification of Fig. 19. 1, chorial villi; 2, vitelline membrane; 3, somatopleure; 4, splanchnopleure.

From the embryo, between the somatopleure and the splanchnopleure, in the pelvic region, is developed a hollow bud, which progressively enlarges separating the two limiting membranes, this is the *allantois*. Its embryonic part becomes the bladder and the urachus and its extra-embryonic part forms the third chorion (or definitive) and the placenta. Fig. 24 shows the first steps of the development of the allantois. Fig. 25 defines a more advanced stage. The allantois progressively invades the space which separates the secondary chorion from the amnion. It may be compared to an umbrella, the handle forming the cord and the spread portion extending more and more to envelope the embryo as in 1, 2, 3, 4 (Fig. 25). We are now at about thet wenty-fifth day consecutive to the fecundation.

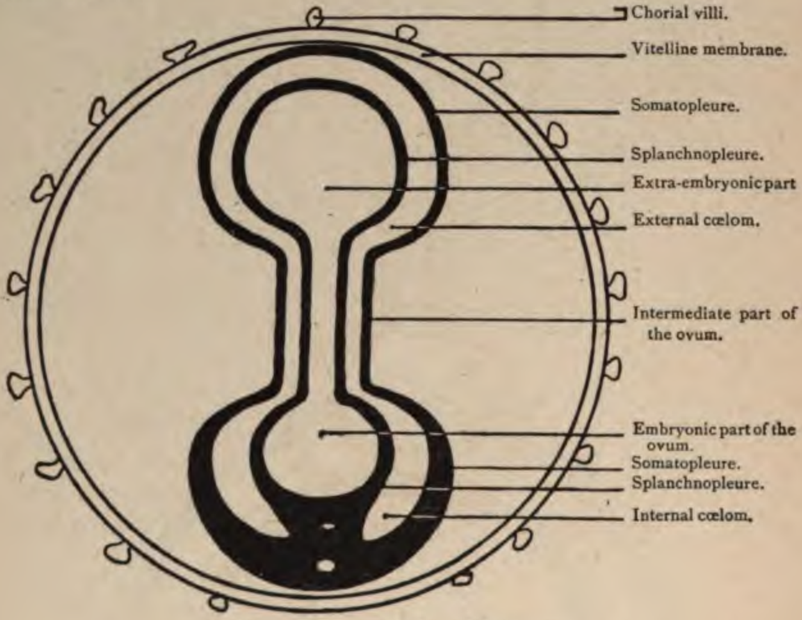


FIG. 21.—Strangulation of the ovum.

At the end of the first month the allantois is at the height of its development. It has carried with it, over all the internal surface of the secondary chorion, vascular ramifications, which are prolonged into the villi. The umbilical vesicle, after the absorption of its contents for the development of the ovule, progressively atrophies.

During all the second month the enveloping membranes change but little, they undergo a development as a whole, all their surface is covered by vascular villi, so that the shaggy ends of these structures can be easily seen by floating the ovum in water.

During the third month, the villi which cover the surface of the ovum atrophy except at the point where the ovum adheres to the uterus and there they take on a remarkable development. This hypertrophied region, where all the life of the allantois seems localized, becomes the placenta; over all the rest of its extent the allantois atrophies, as indicated in Fig. 26.

Outside the placental zone the allantois is entirely united to the secondary chorion, as indicated in a limited region of Fig. 26; thus is formed the tertiary or definitive chorion. Thus it is seen that the primary chorion is formed by the vitelline membrane, the secondary by the extra-embryonic somatopleure; the tertiary by the allantois.

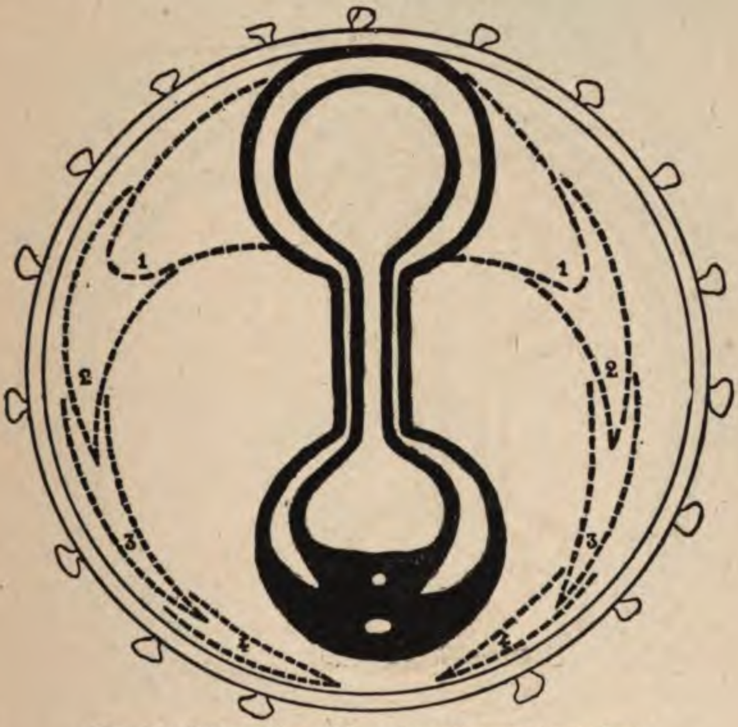


FIG. 22.—Prolongations of the extra-embryonic somatopleure.

The umbilical vesicle continues to atrophy. This atrophy is complete at the end of the third month, and at this moment nutrition by the placenta is definitely substituted. Consequently at this time the embryo becomes the fœtus; that is, at the end of the third month, or at the commencement of the fourth, the reign of the allantois, i. e., the placenta, replaces that of the umbilical vesicle. This vesicle atrophies so completely that it is difficult to find traces of it in the ovum at term.

The ovum during the evolution that we have now to follow, is enclosed and protected by the uterine mucosa, which takes a special evolution transforming it into a new membrane called the decidua, thus designated because it is destined to being cast off at the same time with the ovum.

The preceding description has given us a summary of the formation of the placenta, of the chorion, of the amnion, of the decidua and of the amniotic fluid; we have now to study the details, which will initiate us more intimately into the constitution of these different parts, by taking as a type the ovum nearly arrived at term. But before beginning this detailed description, it is indispensable to embrace at a glance the general configuration of the ovum enclosed by the uterus. The schematic section represented by Fig. 27 permits us to easily grasp this as a whole.

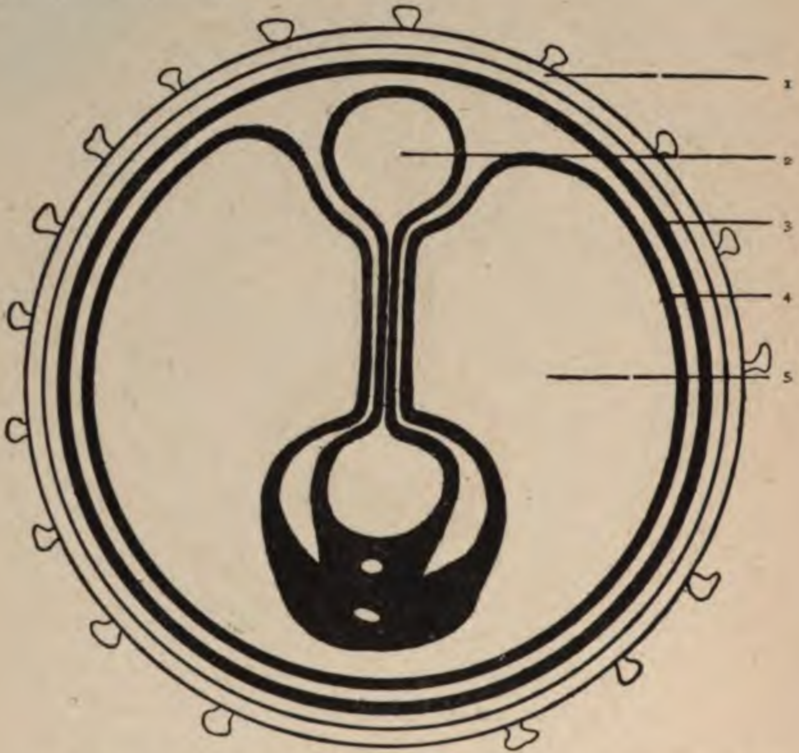


FIG. 23.—Formation of the amnion and secondary chorin. 1, vitelline membrane or primitive chorion: 2, umbilical vesicle; 3, secondary chorion; 4, amnion; 5, amniotic cavity containing the amniotic liquid.

Here there is seen, in passing from the uterus to the fœtus:

1. The uterine wall, thin in the inferior segment at the cervix.

2. The uterine mucosa (partially transformed into the decidua), considerably thickened at the placenta and divided in the rest of its extent into two layers, one applied directly on the ovum (ovuline decidua), the other to the inner surface of the uterus (uterine decidua); the latter is continuous inferiorly with the cervical mucosa. We shall study later the formation of these membranes.

3. The chorion, considerably hypertrophied in one region to constitute the placenta, and atrophied, on the contrary, in the rest of its extent, where it is enclosed between the ovuline decidua and the amnion.

4. The amnion, which is the most internal membrane.

5. The amniotic fluid, which fills the cavity of the amnion, and in which floats the fœtus connected to the placenta by the cord.

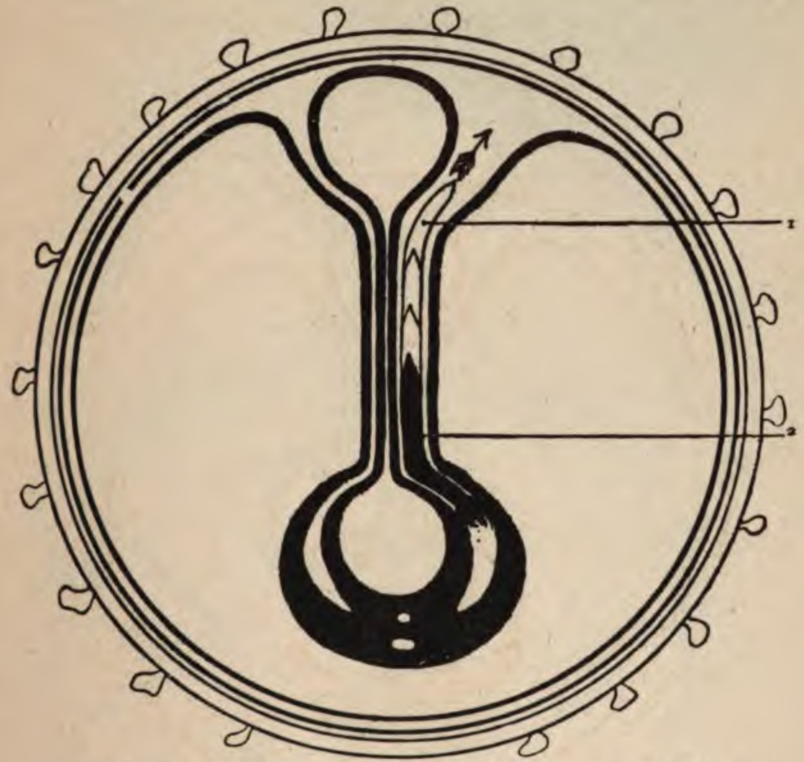


FIG. 24.—Formation of the allantoic bud. 1, progression of the allantoic bud; 2, allantoic bud.

We shall study these different parts in the following order: I. Placenta. II. Chorion. III. Amnion. IV. Decidual membranes. V. Liquor amnii.

I. **Placenta.**—The placenta, forming the union between the maternal and fœtal circulations, is a fleshy and vascular disc, terminating by one of its surfaces in the cord, the other adhering to the internal wall of the uterus. Its weight is about five hundred grammes, nearly that of the liquor amnii, so that the fœtal appendages represent approximately a kilogramme. Dimensions: twenty centimetres in diameter or a little less; three centimetres in thickness toward the center, pressively thin toward the edge. To understand this organ completely it is necessary to study: 1. Its fœtal surface; 2. Its uterine surface; 3. Its circumference; 4. Its structure; 5. Its physiology.

1. The *fœtal surface*, in contact with the liquor amnii, is smooth

in all its extent, for it is covered by the amnion, which can easily be detached. It is grooved by the vessels formed by the expansion of funicular arteries and veins.

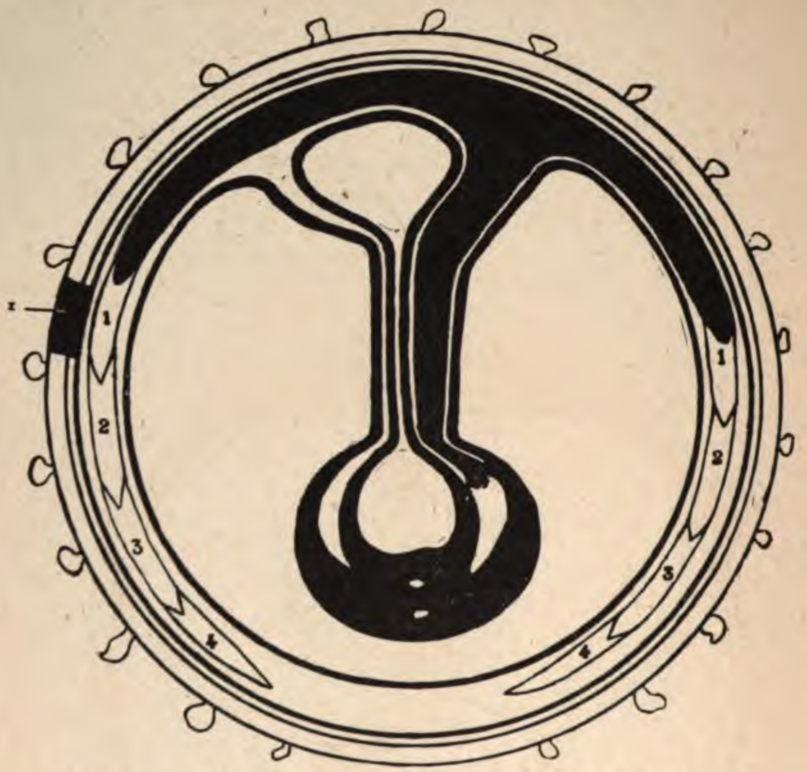


FIG. 25.—Development of the allantois. I, secondary chorion (the two membranes being united in one).

The insertion of the cord may occur in four different regions (Fig. 29):

1. At the center of the placenta (central insertion).
2. Between the center and the periphery (lateral insertion).
3. At the margin of the placenta (marginal insertion).
4. On the membranes (velamentous insertion).

Their relative frequency is as follows:

Central and lateral insertion (equally frequent) 95 per 100.
Marginal insertion 4 per 100.
Velamentous insertion 1 per 100.

In cases of velamentous insertion, which may occur up to twenty centimetres from the placental margin, the vessels may ramify in the membranes (Benckiser), or, on the contrary, they may pursue isolated courses up to the placenta before dividing (Lobstein).

2. The *uterine surface* is unequally projecting and flocculent, and divided into lobes or cotyledons by a number of more or less marked

grooves. These lobes, to the number of ten, fourteen, or more, are divided into lobules, which are composed by a grouping of villi. It is by this surface that the placenta is adherent to the uterus. To state this insertion exactly, it is important to divide the internal surface of the uterus by two parallel plans AB, CD (Fig. 31) passing one at eight centimetres below the fundus of the uterus, the other at eight centimetres from the internal orifice. According to a series of measurements that I have made, it results that the distance which separates the two planes AB and CD, by following the uterine wall, is about sixteen centimetres.

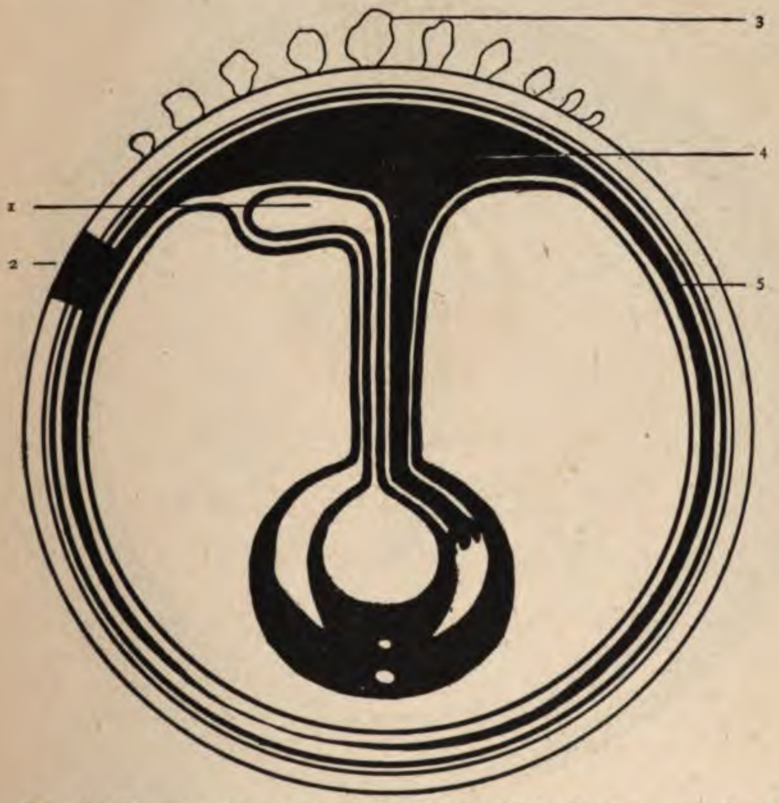


FIG. 26.—Formation of the placenta and tertiary or definite chorion. 1, remains of the umbilical vesicle; 2, tertiary or definite chorion; 3, placental villi; 4, placenta; 5, allantois.

Every placenta which by any part of its surface is inserted below the plane CD, that is to say which encroaches on the uterine circle blended with plane CD, is an inférior polar placenta, or a *placenta prævia.*

Likewise, every placenta which by any portion of its extent is inserted above the plane AB is a superior polar placenta.

Every placenta inserted between these two planes may be called equatorial, for its center coincides with the equator of the uterus, but this variety is rare, the diameter of the placenta being usually greater than sixteen centimetres and thus encroaching on one of the polar circles. From the statistics of forty-eight cases I have found:

Inferior polar placenta in one-third of the cases.
Superior polar placenta in two-thirds of the cases.
Equatorial placenta, exceptionally.

The inferior polar placenta, or placenta prævia, gives rise to a series of accidents which will be studied later.

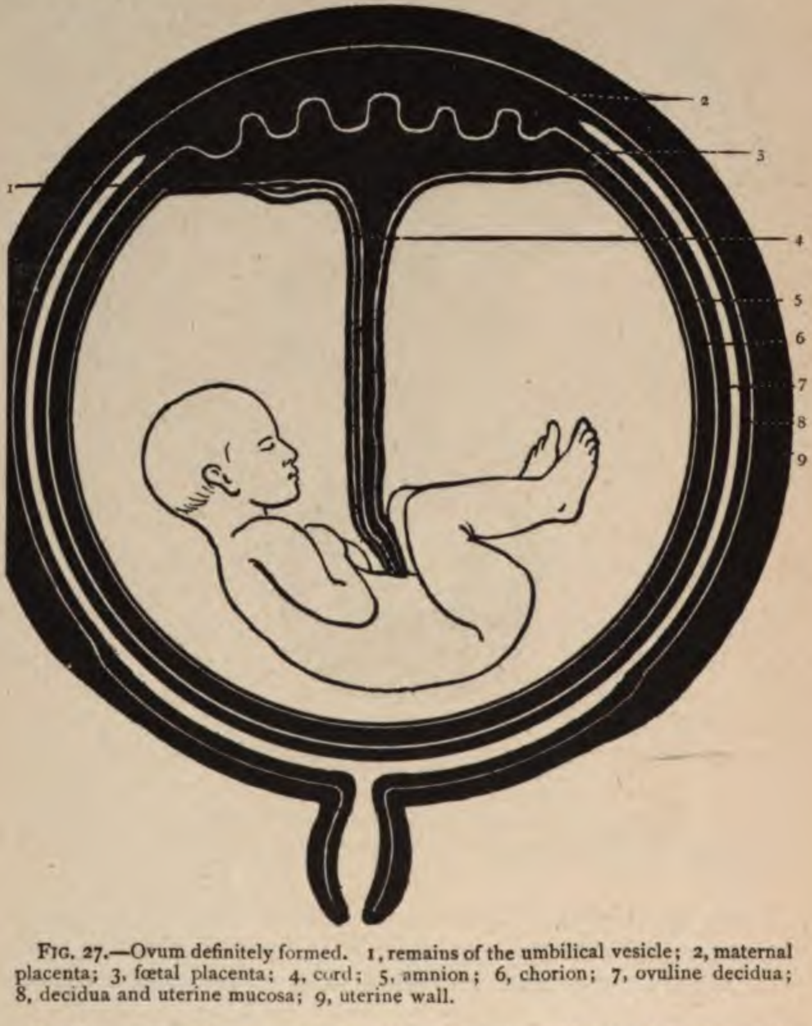


FIG. 27.—Ovum definitely formed. 1, remains of the umbilical vesicle; 2, maternal placenta; 3, fœtal placenta; 4, cord; 5, amnion; 6, chorion; 7, ovuline decidua; 8, decidua and uterine mucosa; 9, uterine wall.

3. The circumference of the placenta is constituted by the union of the membranes with this organ. This placental margin, regular in a rounded or oval placenta, becomes more or less tortuous when

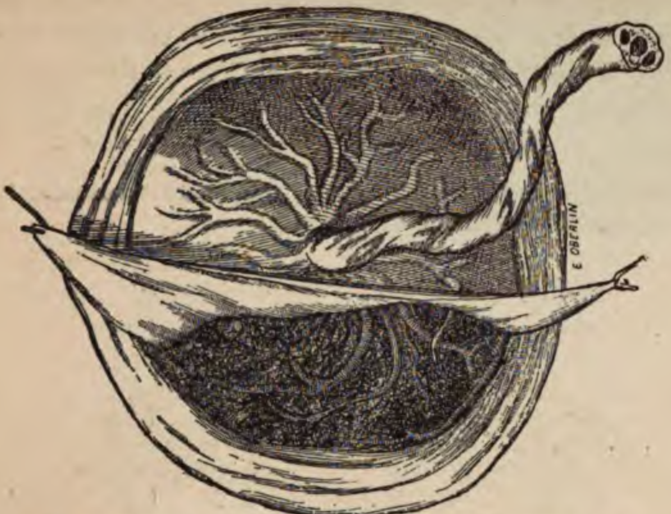


FIG. 28.—Fœtal surface of the placenta, with amnion partly uplifted.

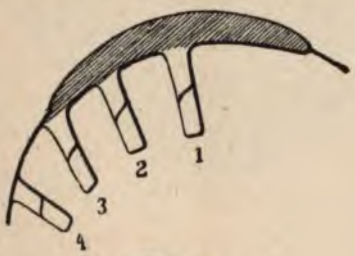


FIG. 29.

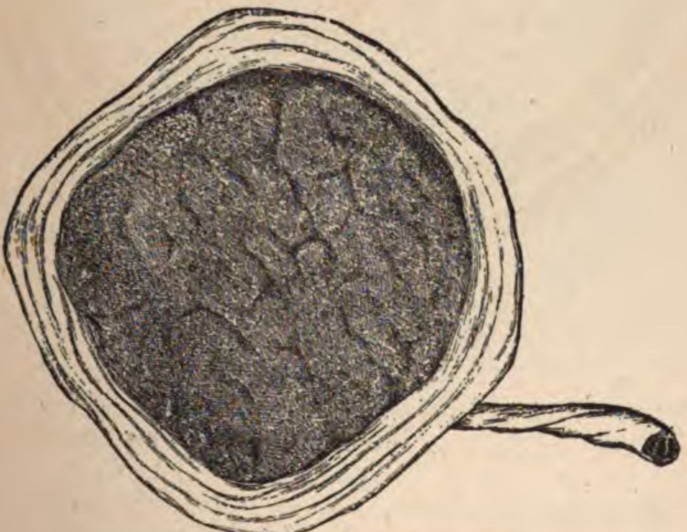


FIG. 30.—Uterine surface of the placenta.

the form departs from the normal type. Thus we are led to say a few words on the different forms of placenta in simple pregnancy:

A. Sometimes the placenta is unilobed, the most frequent form.

B. Sometimes it is multilobed, but not having the lobes entirely separated.

C. Sometimes it is multilobed, with the lobes so distinct that there appear to be several placentas.

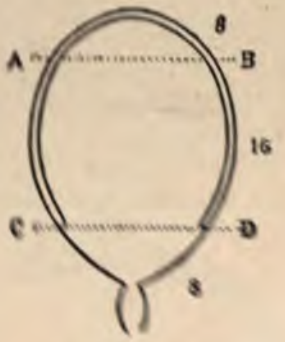


Fig. 34.

As examples of these varieties we have under:

A. Unilobed placenta.

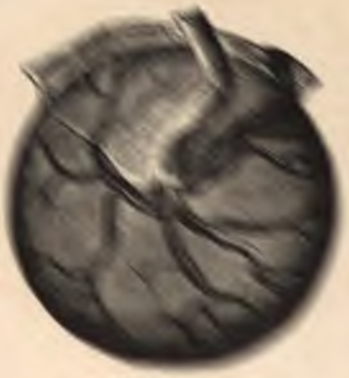


Fig. 35.

B. Circular form (Fig. 36).

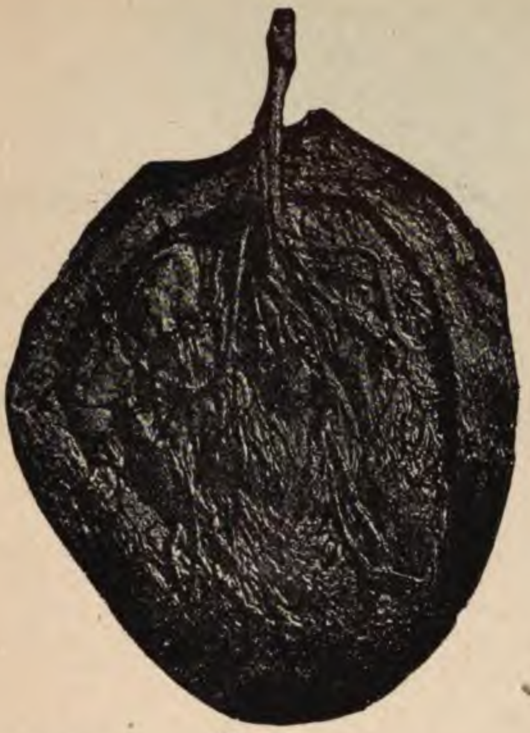


FIG. 33.

2. Oval form (Fig. 33).

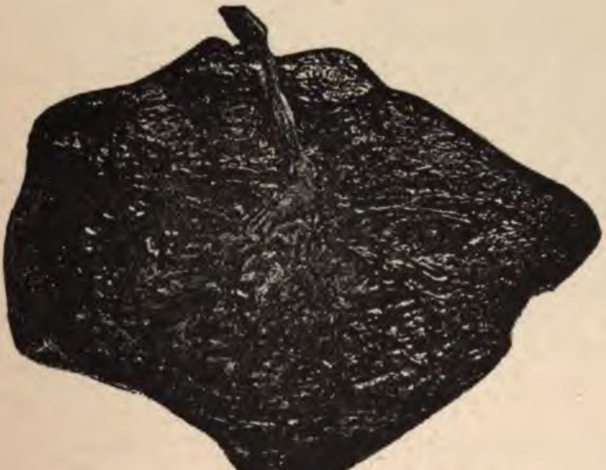


FIG. 34.

3. Irregular form (Fig. 34).

B. *United multilobed placenta.*

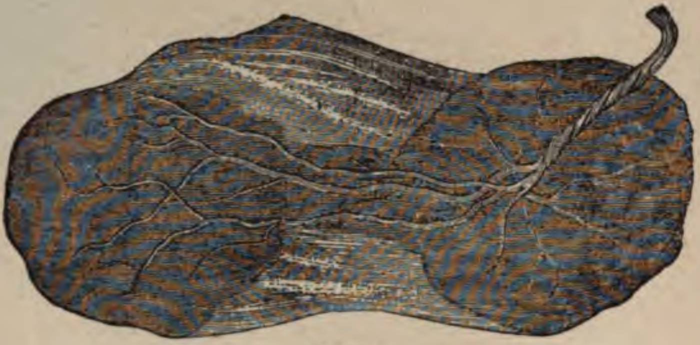


FIG. 35.

1. Two equal lobes (Fig. 35).

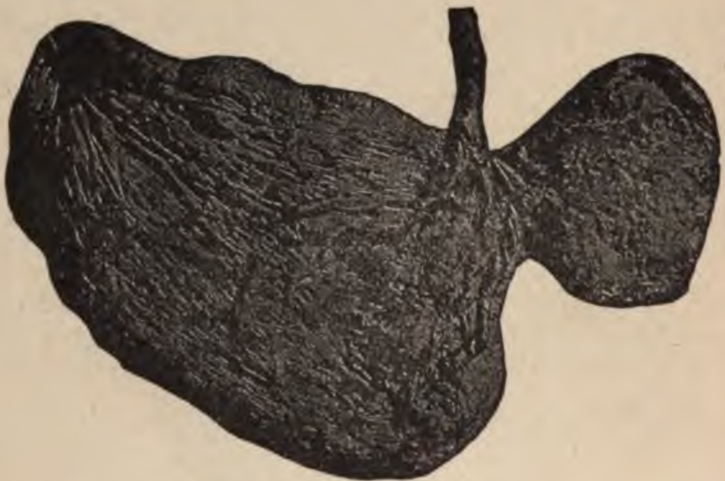


FIG. 36.

2. Two unequal lobes (Fig. 36).

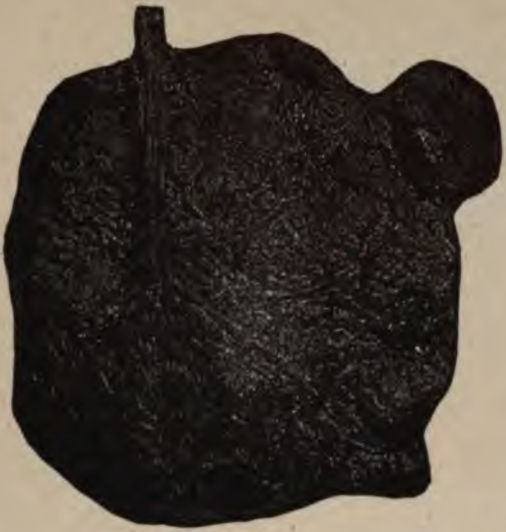


FIG. 37.

3. There exist more than two lobes (Fig. 37).

C. *Placenta with separate lobes.*

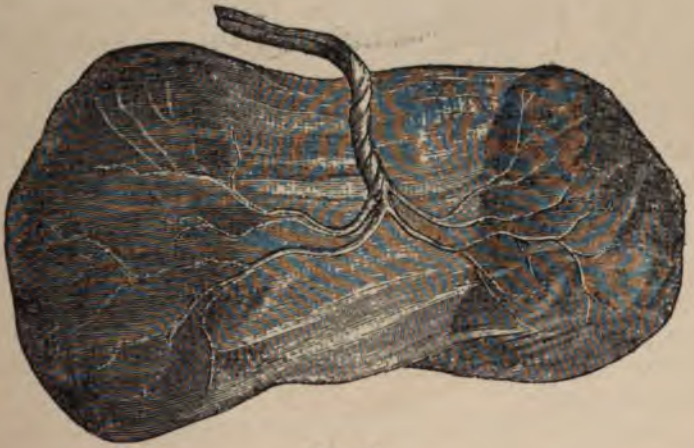


FIG. 38.

(a). Two equal lobes (Fig. 38).

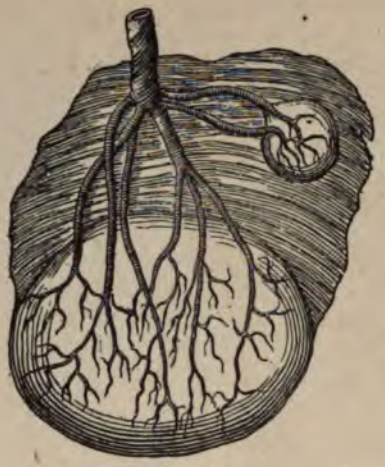


FIG. 39.

(b). Two unequal lobes (Fig. 39).

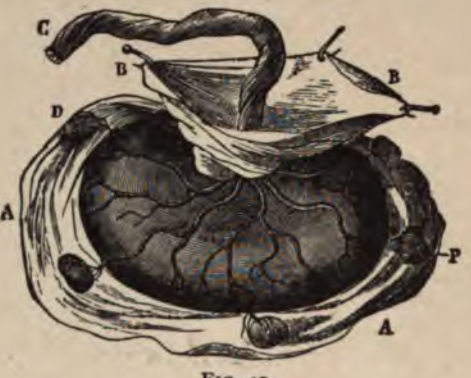


FIG. 40.

(c). More than two lobes (Fig. 40).

4. *Structure.*—Let us take a perpendicular section of the uterine wall, the placenta, and the cord, as represented in the schematic illustration of Fig. 41. We then find, from the superficies toward the center:

1. Beneath the peritonæum (which is not given in the illustration) the muscular wall.

2. Beneath the uterine mucosa, transformed into the *maternal placenta* containing a series of lacunar spaces, the remains of the glandular culs-de-sac more or less modified and terminating superficially in a series of villi.

3. The *fœtal placenta*, shaggy on the uterine side, by virtue of its rich mass of villi interlacing with those of the maternal placenta; smooth on the fœtal side, where it is in contact with the amnion.

4. Finally, the umbilical cord.

Through all these tissues is found a vascular network, the details of which I shall give after having explained at greater length these different parts.

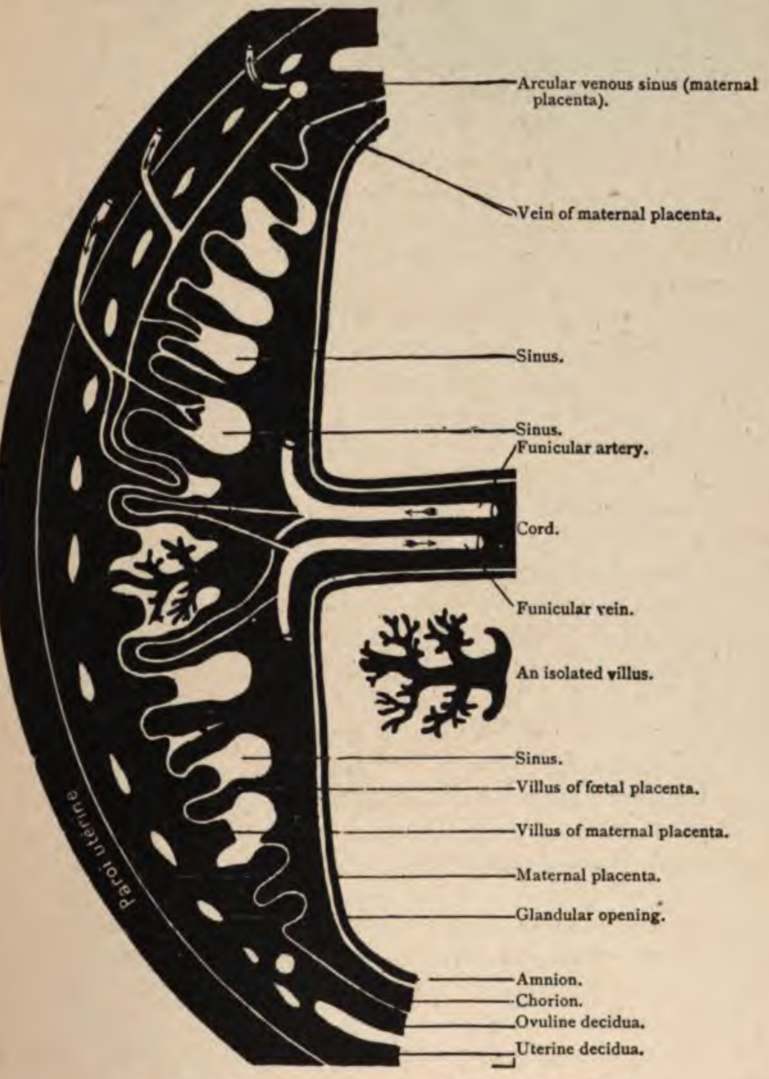


FIG. 41.—Schema representing the structure of the placenta.

A. *Maternal placenta.*—The uterine mucosa, transformed in the placental region, is divided into two parts, separated by the more or less regular line of the glandular lacunæ. It is at this place that separation occurs at delivery, the eccentric part remaining adherent to the uterus to constitute the new mucosa, the other portion, the decidual, follows the placenta. When we examine the uterine surface of a recently-expelled placenta, it is the portion corresponding to this series of lacunæ that meets our eyes. The part near the fœtal placenta terminates in series of villi, somewhat projecting and ramifying. In a vascular point of view, these villi are of two kinds, as will be seen in Fig. 41. In one variety the artery is continuous with the vein after having formedd a more or less rich vascular network. In another the artery opens directly by one or two orifices into spaces called sinuses. From these villi arise other veins. In this way the blood returns into the venous system and enters the uterine sinuses directly or by the intermediate circular sinus which exist around the placenta.

B. *Fœtal placenta.*—The framework of the fœtal placenta is formed, like that of the maternal, of connective tissue, with fusiform and star-shaped cells. It is adherent by its fœtal surface to the chorion, of which it is only the expansion, and is united to the maternal placenta by a series of rich and luxurious villi. The villi are of two kinds: one absolutely free, floating without adhesions in the sinuses, the other terminating by the extremity in the maternal placenta. These villi are furnished with vessels in the form of a capillary network with an apparent artery and an afferent vein.

From the preceding description it is seen that the union of the two placentas, fœtal and maternal, occurs through the intermediate villi. Some of the maternal and fœtal villi are in contact, and some are separated by the blood of the sinus which surrounds them like an atmosphere. The blood of these sinuses is exclusively maternal. There is no direct communication between the blood of the mother and that of the fœtus, but a simple mediate contact, through the flattened epithelium which forms a continuous layer at the surface of the villi, and through the walls of the vessels. The physiological changes which we have now to study occur through the medium of this barrier.

5. *Physiology.*—In the placenta, the fœtal and the maternal blood being in mediate contact, the fœtal blood is relieved of its carbonic acid and absorbs oxygen, just as this occurs in the lungs of an adult. Thus a veritable respiration takes place at this point. Besides this, the nutritive elements contained in the maternal blood are absorbed by the fœtal blood, so that the placenta plays a double role, respiratory and nutritive, taking the place, for the fœtus, of the lungs and of the digestive tract. Aside from the normal constituents carried by the maternal blood, there may be abnormal elements, such as the different medicaments and divers microbes. The iodide and chlorate of potash and salycilic acid ingested by the mother during labor are found after birth in the fœtal organism. The same is true of potassium nitrate, of yellow prussiate of potash, of bromide of potassium and sulphate of quinine, but their passage is slower. Chloroform also passes from the

mother to the fœtus, but without danger to the child. Solid elements may pass through the placenta. The transmission of microbes has been recently established. The majority of the pathogenetic microbes traverse the placenta but with unequal facility. However, the placenta is not a simple filter, it also possesses the power of producing sugar; the *glycogenic function* identical with that pertaining to the adult liver. The placenta not only serves the fœtus as a digestive tube and lung, but also takes the part of the hepatic gland.

II. **The Chorion.**—This simple name is given to the tertiary or definitive chorion. Situated between the decidua, which covers its external surface, and the amnion, which lines its internal surface, it is more adherent to the first than to the second. The adhesion with the decidua is immediate, that with the amnion is mediate and occurs through an intermediate glutinous substance, the reticulated magma. This disposition explains why the amnion is so easily detached from the chorion during labor, while detachment of the chorion from the decidua is rarely observed; and why the liquor amnii, transuding through the amnion, so easily accumulates between this membrane and the chorion.

The chorion is composed of a stroma of connective tissue. Its external surface is covered by a layer of pavement cells, with which it is in contact with the decidua. Rich in vessels at the second month of gestation, it is completely deprived of them after the complete and definitive formation of the placenta; however, exceptionally these vessels may persist.

III. **Amnion.**—The amnion is the most internal membrane of the ovum. After having covered all the internal surface of the ovum it is continued on the placenta and then to the cord, which it surrounds like a sheath, terminating at the umbilicus, where the cutaneous covering of the fœtus begins. The amnion is composed of two layers; an external, containing connective tissue with some non-striated muscular fibres, and an internal, or epithelial, directly in contact with the liquor amnii. Vessels are wanting, except in the vicinity of the placenta, where during the first months of pregnancy are met the *vasa propria* which secrete the amniotic liquor, and the abnormal persistence of which would be one of the causes of hydramnios.

IV. **Decidual Membranes.**—The decidual membranes being formed at the expense of the uterine mucosa, are then of maternal origin. I shall describe them here, however, because their union with the ovum is so intimate, and because, as their name indicates, they are cast off with it. The decidual membranes are three in number, the utero-placental, the uterine, and the ovuline. How are these decidual membranes formed? On the arrival of the ovum in the uterine cavity it lodges in the mucous folds as indicated in Fig. 42. The two projections of the mucosa, which limit the fold in which the ovule reposes, take on a rapid development and surround the ovule more and more (Fig. 43). Soon they enclose it completely, as in Fig. 44. At this moment there exist three distinct parts: The first is formed by the union between the ovum and the uterine wall; this is the utero-placental decidua, formerly called the serotrine decidua. The second lines the uterine wall and only undergoes slight modifications; this is the uterine or true decidua. The third directly covers the ovum, by means of the development already described; this is the ovuline decidua or *decidua reflexa*.

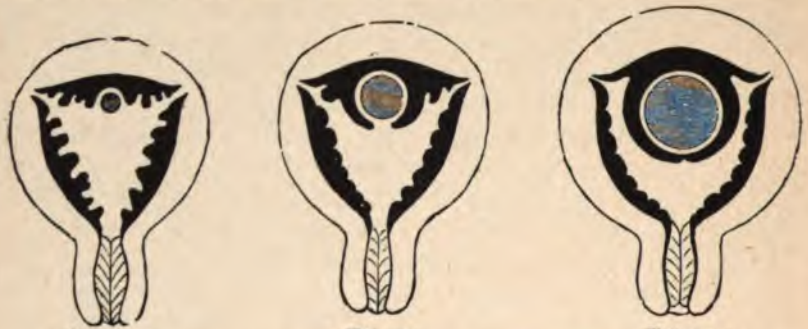


FIG. 42. FIG. 43. FIG. 44.

Enclosure of the ovum by the uterine mucosa.

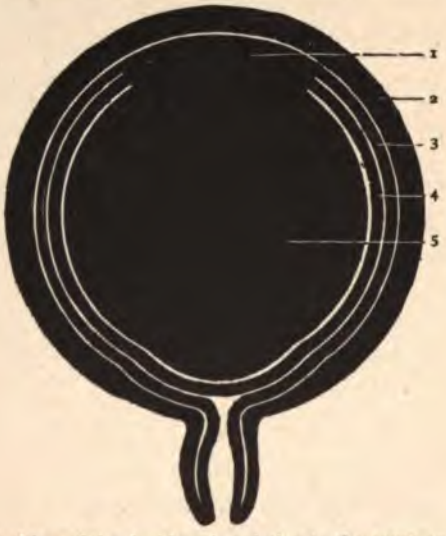


FIG. 45.—Disposition of the deciduas in relation to the ovum and uterine wall. 1, placenta; 2, uterine wall; 3, uterine decidua; 4, ovuline decidua; 5, ovum.

These three decidual membranes being known, let us follow their evolution. During the first three months of pregnancy, the ovuline and the uterine deciduas are separated by a space, which permits the passage of the spermatozoids to the tube and a second fecundation after the first. These facts will be studied later under super-fecundation. With the second three months the conditions change, the ovuline and the uterine deciduas are in contact and quickly contract intimate adhesions in such a manner (Fig. 45) that the uterine wall is fused with the ovum; thus, at this moment, super-fecundation becomes impossible unless a double uterus exists. It is likewise understood why abortion during the second three months is so often accompanied by the retention of membranes and especially of the decidua.

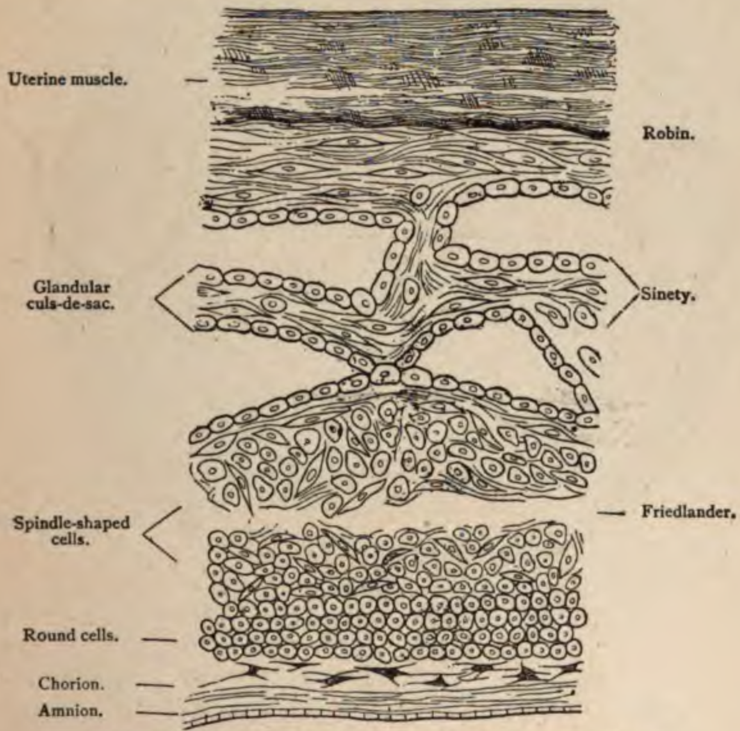


FIG. 46.—Section of the internal wall and of the membranes.

During the last three months, separation from the ovum and from the uterine wall is progressive. As for the placenta separation occurs at the moment of delivery at the level of the glandular culs-de-sac. As to the membranes, opinions differ. To comprehend the place where separation occurs, let us follow (Fig. 46) the different layers met in going from the uterus to the liquor amnii. Beneath the peritonæum, not represented in the illustration, is found the uterine muscle, then the mucosa and the united deciduas in three layers; the first iamina strewn with glandular culs-de-sac, the second composed of elongated cells, the third of round cells.

Concentrically are the chorion and the amnion. Now, the separation occurs:

According to Robin, at the union of the muscle with the mucosa, which thus is cast off as a whole, leaving the uterine wall naked.

According to Sinety, at the level of the glandular culs-de-sac, the same as the placenta.

According to Friedlander, in the middle of the layer of elongated cells.

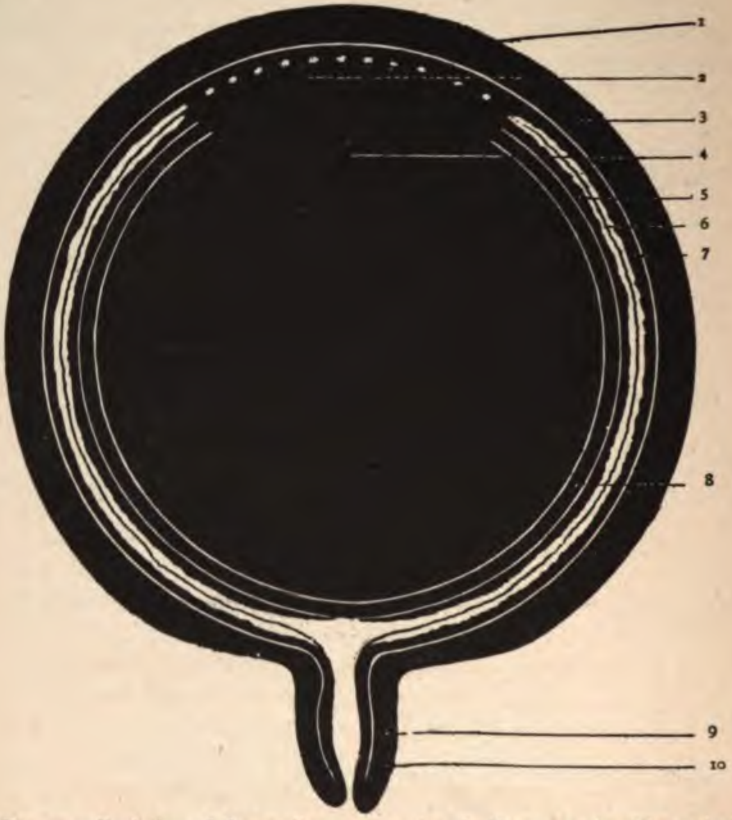


FIG. 47.—Evolution of the ovuline and uterine deciduas. 1, glandular culs-de-sac; 2, placenta; 3, uterine wall; 4, ovum; 5, uterine decidua; 6, membrane of new formation covering the non-decidous mucosa; 7, non-decidous uterine mucosa; 8, ovuline decidua; 9, cervix; 10, mucosa of the cervix.

With regard to the decidua, the opinion of Sinety appears the most admissible. For the membranes as for the placenta separation occurs at the level of the glandular culs-de-sac, the superficial portion of the uterine decidua remaining adherent to the ovuline decidua (Fig. 47) and thus only this superficial portion is cast off with the fœtus. At the moment of term, the detachment, which commences in the vicinity of the internal orifice, and gains the fundus by degrees, is usually complete or at least very extended.

V. **Liquor Amnii.**—The amniotic fluid appears a little after the formation of the amnion. At four months and a half its weight is equal to that of the fœtus. At term it amounts, on the average, to half a litre. However, there are very extensive variations. But when the quantity exceeds a litre there results the pathological state known as hydramnios, a question belonging to puerperal pathology. Clear and transparent in the beginning of pregnancy, slightly yellow at the end, in the pathological state it may become greenish or red. This liquid, in which is found some elements proceeding from the epidermis of the fœtus, from the renal and from the amniotic epithelium, contains chiefly chloride of sodium, lactate of sodium and albumin.

The origin of the liquor amnii is not yet definitely settled. Some suppose that it proceeds from the mother, by filtration through the membranes into the amniotic cavity. Others believe it to proceed from the ovum, arising from the annexes, from the vasa propria of Jungbluth, from the cord, or from the fœtus itself by ıenal and cutaneous secretions.

Physiology.—The uses of the amniotic liquid are multiple. By its presence it creates a veritable liquid atmosphere for the fœtus. If the uterine wall was applied on the fœtus, funicular circulation would certainly be impossible. During labor, the liquor amnii accumulating in the bag of waters, favors the opening of the genital canal.

II. **Intermediate portion of the ovum.**—*The cord.*—The umbilical cord is the flexible stem which joins the placenta to the fœtus. We have already seen its formation.

FIG. 48.—Straight cord.

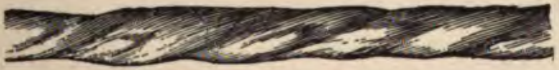


FIG. 49.—Twisted cord.

External conformation.—Smooth and whitish at its superficies, the cord sometimes represents a plain stem (Fig. 48), sometimes, on the contrary, a stem twisted on itself, and this tortion may be directed from right to left (Fig. 49), or from left to right. Sometimes on the same cord a torsion in an inverse direction is noted at the two extremities. The relative frequency of the different varieties of funicular torsion (the spiral will be described by following the cord from below upward) may be indicated by the following figures:

Sinistro-torsion, 72 per 100.
Dextro-torsion, 25 per 100.
Double torsion, 1 per 100.
No torsion, 2 per 100.

The torsion of the cord is due to the disposition of the vessels, which will be studied later.

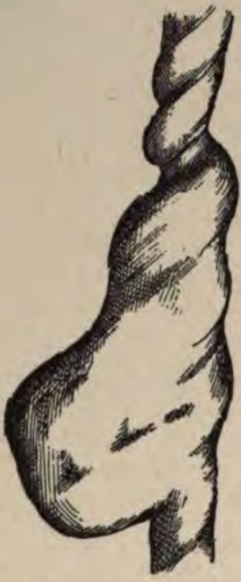


FIG. 50.—Circular nodosity.

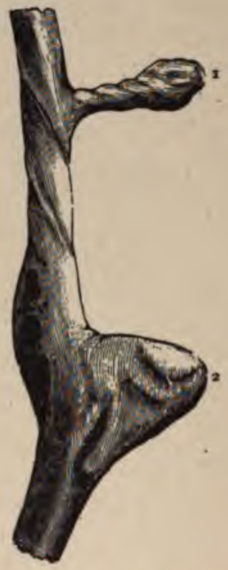


FIG. 51.—Sessile and pedunculated nodosities. 1, pedunculated nodosity; 2, sessile nodosity.

The usual length is fifty centimetres at term. Variations: maximum, one metre, seventy-eight centimetres (Neugebauer); minimum, total absence, where the umbilicus is adherent to the placenta. The size is nearly that of the little finger. Variations: maximum, seven centimetres and one-half in circumference (Bell); minimum, the size of a goose quill (Scanzoni). Much more marked restrictions may exist and compromise the circulation. On the cord are often found nodules, that may be circular (Fig. 50), sessile or pedunculated (Fig. 51). The contents of these nodules may be gelatinous (Wharton's jelly), arterial (vascular loop), or venous (venous loop or venous dilatation). With these nodules, or simple swellings of the cord, there must not be confused the true knots, which will be studied under pathology. The insertion of the cord takes place for one part at the umbilicus and for the other part at the internal surface of the placenta. The latter insertion has been fully described.

Interior conformation.—When the cord is cut transversely, it is found composed (Fig. 52) of a continuous amniotic envelope, filled and distended by Wharton's jelly. In this substance are contained three vessels, a large vein and two small arteries. The relative disposition of these vessels is variable. The arteries and the vein may pursue a parallel course without a trace of twisting (Fig. 53). The vein may be twisted around the arteries (Fig. 54) in a spiral form. The two arteries may twist around the vein (Fig. 55). Finally, the twisting of the three vessels may be simultaneous and reciprocal (Fig. 56).

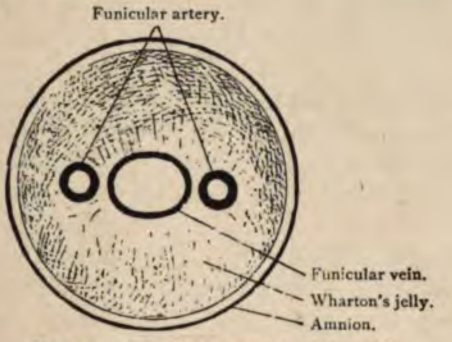


FIG. 52.—Transverse section of the cord.

As anomalies, I may note the absence of one artery, or the presence of a third. Exceptionally, there may be two or three veins.

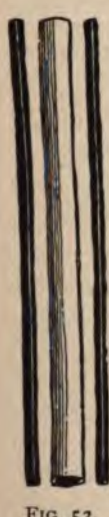


FIG. 53.

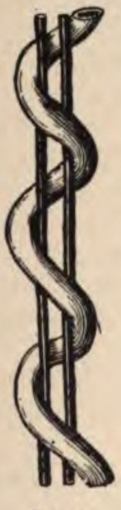


FIG. 54.

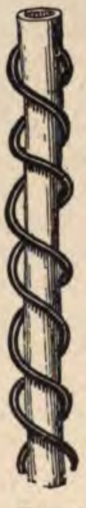


FIG. 55.

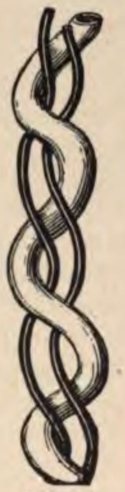


FIG. 56.

In the interior of the vessels are found incomplete semilunar valves, which sometimes become circular, like a diaphragm. The physiological role of these valves is not well known, and besides, must be of slight importance, since the obstruction they produce is incomplete. They may play a certain part in the production of the funicular souffle. The existence of fine vessels in the cord, the *vasa propria* (Ruge), has been noted; the existence of lymphatics and nerves has not been proven.

Physiology.—The cord serves to unite the mother and the fœtus, through the intermediate placenta. The blood carried to the placenta by the umbilical arteries is returned to the fœtus by the umbilical vein, after having undergone respiratory and nutritive modifications in the placenta. Contrary to the usual purposes of these vessels, it will be observed that here the arteries carry the dark blood and the vein the red blood.

III. Embryonic portion of the ovum.—*The fœtus at term.*—There is no positive sign that will permit us to affirm that the fœtus is at term; thus we are obliged, for this determination, to use a series of points which, as a whole, afford some certainty. The points are:

1. The information furnished by the mother, on the subject of the probable duration of the pregnancy, at the moment of delivery (last menstruation, a single coitus, first movements of the fœtus).

2. The weight of the child, which is, on the average, three kilogrammes, attaining quite often three thousand five hundred grammes, but the variations from greater to less may be considerable—maximum nine thousand grammes (Riembault); minimum, one thousand three hundred grammes (Blot). It must also be understood that this inferior limit is somewhat arbitrary, in the default of exact knowledge of the date of conception.

3. The length of the fœtus, measured from head to foot, is generally fifty centimetres—equal to that of the umbilical cord. Variations of five centimetres, more or less, are not rare.

4. The development of the nails and hair is too variable to be taken into serious consideration. In general, in the fœtus at term, the nails exceed the extremity of the finger. The hair presents a length of two to three centimetres, or even more, and the fine down which covers all the hairy regions appears more developed before term than at term.

5. In the male infant the testicles have descended into the scrotum, but this descent sometimes occurs before term, and does not always exist at term.

6. The ossification of the skull, the only bones that can easily be explored in the living child, is too variable in its degree to afford clear information. In the dead fœtus there may be recognized in a section of the inferior part of the femur a point of ossification that Beclard considers a positive sign of the maturity of the fœtus. The researches of Hecker and of Hartman have shown, however, that it sometimes exists before term, and that it may be wanting

at term. No one of these signs is positive, then, but their recognition permits an approximate valuation, generally sufficient to determine if the child is at full term.

Form and topography.—The general form of the fœtus, rolled up in the cavity of the uterus, is ovoid (Fig. 58), the large extremity corresponding to the breech and the small to the head. This is the somatic ovoid.

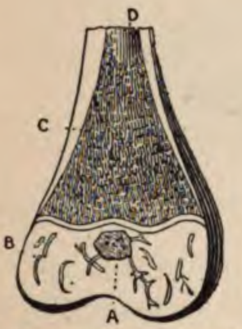


FIG. 57.—Beclard's point of ossification.

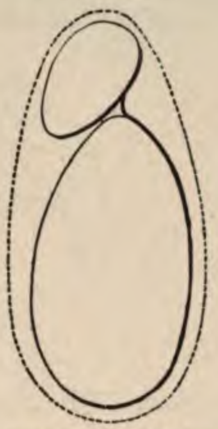


FIG. 58.—Somatic ovoid.

The somatic ovoid may be divided into two secondary ovoids: Cephalic (head), cormic (trunk). These are united by the neck.

The topography of the cormic ovoid needs no special consideration; the fœtal trunk is identical, with smaller dimensions, with that of the adult; it is an adult in miniature.

This is not true with regard to the cephalic ovoid. In exploring the head of the new-born, the union of the bones which compose it is found. These are real solutions of continuity (sutures and fontanelles) that are of considerable importance in obstetrics, for a knowledge of them permits diagnostication of the situation and the relations of the cephalic extremity which presents during delivery.

The sutures are the lines of union of two contiguous bones and the fontanelles are the confluents formed by the meeting of two or more sutures.

The *fontanelles* are two, principal or median; and two, secondary or lateral.

The two median fontanelles are:

1. The lambda, or the posterior fontanelle (small fontanelle), at the union of the occipital and the two parietal bones, a virtual fontanelle, for the bones do not leave a free space at this point.

2. The bregma, or anterior fontanelle (great fontanelle), at the union of the parietal and the frontal bones, a real fontanelle, constituted by a large fibrous space, having the form of a lozenge, the

frontal borders being more prolonged than the parietal. This fontanelle generally closes two or three months after birth.

The two secondary, or lateral, are:

1. Asterion, at the union of the occipital, the parietal and the temporal bones, a virtual fontanelle.

2. The pterion, at the union of the frontal, the parietal and the temporal bones and the great wing of the spenoid, likewise a virtual fontanelle and only of slight importance.

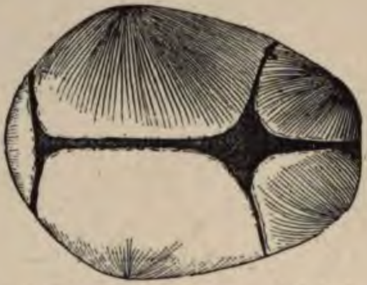


Fig. 59.—View of the upper part of the head.

Finally, there exist, as anomalies and consequently as accessory, two other median fontanelles:

1. The obelion, a lozenge-shaped space, at one or two centimetres in advance of the lambda on the biparietal suture.

2. The glabella, a fibrous median space, of oval form, sometimes found on the bifrontal suture at about two centimetres from the root of the nose.

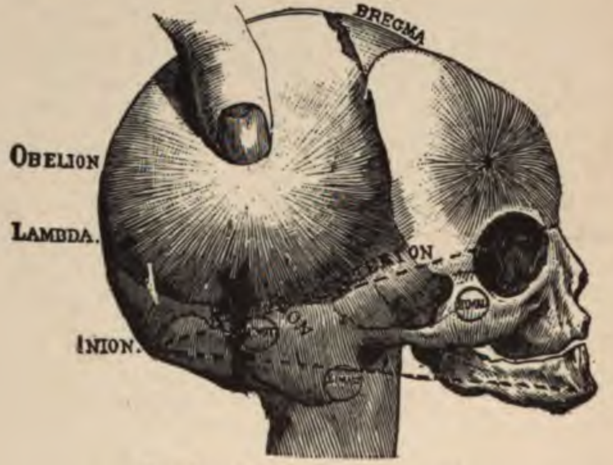


Fig. 60.—Lateral view of the head.

The *sutures* are named from the bones which enter into their formation. These we find:

1. The biparietal suture, which, beginning at the occiput, is

continuous, after traversing the bregma, with the bifrontal suture. These two sutures together are designated as the sagittal suture.

2. The occipito-parietal suture, also called the lamdoid, on account of its analogy with the Greek letter of the same name.

3. The fronto-parietal suture, which cuts the sagittal perpendicularly and terminates laterally in the pterion.

4. The temporo-parietal suture unites the squamous portion of the temporal to the parietal.

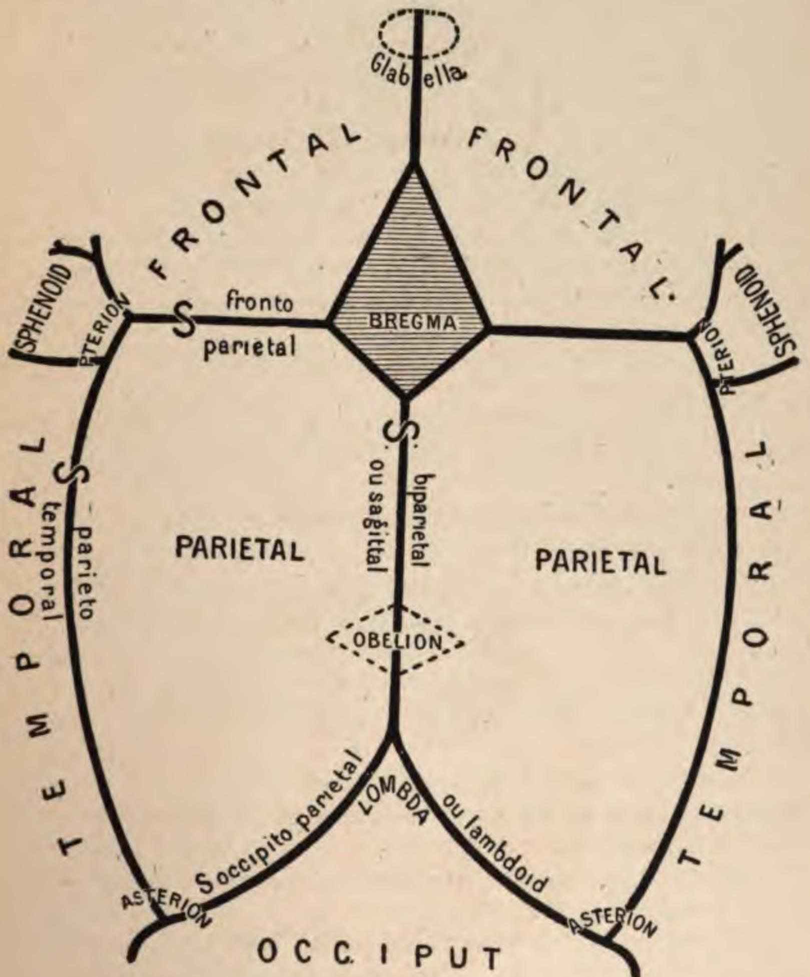


FIG. 61.—Cephalic planisphere.

The other sutures present only a secondary importance and do not merit especial mention. In the track of these sutures, in particular the biparietal suture toward its posterior portion, there exist some separate bones, more or less disfiguring the topography and interfering with the diagnosis.

Diameters.—If the two fœtal ovoids were regular, it would be sufficient to take the length and the width to recognize the exact dimensions, but their irregularities necessitate the determination of a certain number of diameters, with which the physician should be familiar if he wishes to comprehend the mechanism and the difficulties of delivery. Let us study successively the two ovoids, the cephalic and the cormic.

A. *The cephalic ovoid.*—The fœtal head is composed of two parts that are essentially different: One forms an irregular plane, a solid osseous mass, extending from the occiput to the face, this is the base of the cranium. The other constitutes a case enclosing the brain and surmounting the base, with which it is continuous by its base, this is the vault of the cranium. The vault is of predominant importance in normal delivery and in dystocia, when perforation and crushing are not necessary but when the cerebral substance must be evacuated to reduce the head; the base, on the contrary, opposes the obstacle to delivery. Thus is seen the different roles of these two portions of the head and the necessity of measuring their principal diameters.

The vault of the cranium, that is, the intact head, has three principal diameters:

1. The mento-maximum, extending from the point of the chin to the most distant point of the sagittal suture, at some millimetres in front of the lambda.
2. The biparietal, joining the two parietal protuberances.
3. The bitemporal, extending from one pterion to the other.

The base of the cranium has also three principal diameters:

1. The inio-nasal, which extends from the inion to the root of the nose.
2. The bimalar, uniting the two malar tuberosities.
3. The biosteric, extending from the asterion to that of the opposite side.

Aside from these diameters, which are to a certain extent static, there are others, of an importance only comprehended after the study of the mechanism of delivery, which may be called dynamic. I will only simply mention them here, returning later to their study apropos of parturition. These are:

1. The suboccipito-bregmatic, extending from the union of the occiput and the neck to the center of the bregma.
2. The suboccipito-maximum, from the same posterior point to the most distant part of the bifrontal suture.
3. The submento-bregmatic, from the union of the chin and the neck to the center of the bregma.
4. Submento-maximum, from the same anterior point to the most distant part of the sagittal suture.

The dimensions of these different diameters are as follows:

Static diameters.—

Mento-maximum, 13½ centimetres.
Inionasal, 11½ centimetres.
Biparietal, 9½ centimetres.
Bitemporal, 8½ centimetres.
Biasteric, 7½ centimetres.
Bimalar, 6½ centimetres.

Dynamic diameters.—

Suboccipito-bregmatic, 9½ centimetres.
Suboccipito-maximum, 10½ centimetres.
Submento-bregmatic, 9½ centimetres.
Submento-maximum 11 centimetres.

For the last, 10½ could be admitted, but it is important to know that it is greater than the suboccipito-maximum, and we would then have a series of figures easily retained, 6½, 7½, 8½, 9½, 10½, 11½, 13½, from 6 to 13, with the exception of 12, by adding a half to each.

The mento-maximum and the inio-nasal, as well as the dynamic diameters, are antero-posterior, the others are transverse.

B. *The cormic ovoid.*—The trunk of the fœtus, much more irregular and more reducible than the head, also presents several diameters, which are, on account of its compressibility, only of secondary importance. I will only note:

1. The bitrochanteric, uniting the two trochanters.

2. The pubo-sacral, extending from the upper part of the sacral promoting to the middle of the anterior surface of the pubes.

3. The bisacromial, from the acromion of one side to that of the opposite side.

4. The sterno-dorsal, a horizontal line from the middle of the sternum to the corresponding spinous apophysis.

The diameters measure on the average:

Pubo-sacral, 6 centimetres.
Bitrochanteric, 9 centimetres.
Sterno-dorsal, 9 centimetres.
Bisacromial, 12 centimetres.

Figures 6, 9, 12 are easily retained.

According to these dimensions one would be led to believe that the thorax forms the large extremity of the cormic ovoid and the breech the smaller portion, but the two diameters of the breech are much less reducible than those of the thorax and the addition to the pelvis of the lower limbs folded on themselves considerably increases the volume of this fœtal part and renders it really larger than the thoracic.

Physiology.—A. *Circulation.*—The fœtus presents two distinct circulations during its sojourn in the uterine cavity. The first (embryonic), depending on the umbilical vesicle; the second (fœtal), developing with the allantoid vesicle and replacing the preceding, this is the placental circulation.

The fœtal circulation (Fig. 62) differs from the definitive in two essential points: 1. By the existence of a funicular placental territory, which brings the fœtal blood in contact with the maternal.

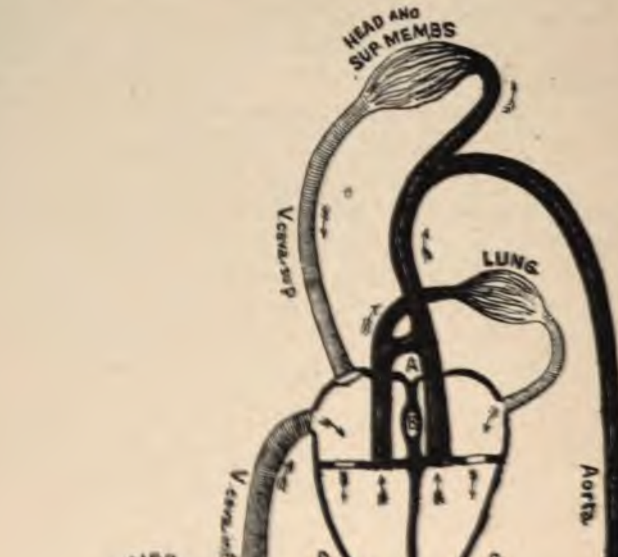


FIG. 62.—Schema of the fœtal circulation.

2. By the communication of the aortic with pulmonary circulation in two ways: *a*, through the foramen ovale (Fig. 62 B), which connects the two auricles; *b*, the ductus arteriosus, uniting the pulmonary artery and the aorta. These communications, which are

destined to disappear at birth, permit the blood to make the complete round of the circulation without passing through the lungs, and these structures remain rudimentary during intrauterine life.

B. *Respiration.*—This function comprises three successive processes: 1. The oxygenation of the blood, accompanied by the elimination of carbonic acid. 2. The transportation of oxygen to the different tissues of the organism by the intermediatory circulation. 3. The deoxygenation of the blood, with combustion as its result. The last two processes are only present in the fœtus to a small degree. The first process is essentially different from that of the adult by occurring in the placenta instead of in the lung. In passing through the placenta the fœtal blood absorbs oxygen from the maternal circulation and discharges its carbonic acid. Every cause of arrest of the placental circulation, of partial or total suppression of the function of the placenta, leads to asphyxia of the fœtus.

C. *Nutrition.*—The nutrition of the fœtus is carried on both by the blood and liquor amnii. In the placenta the blood is charged with the nutritive elements contained in the maternal circulation, for the placenta permits the filtration of solid, liquid and gaseous elements. The nutritive role of the amniotic liquid is not so well established as that of the blood. It possesses nutritive qualities for it contains albumin and salts. It is swallowed by the fœtus, for experiments on animals by freezing have shown the existence of ice extending from the amniotic liquid through the mouth and œsophagus to the stomach. Examination of the meconium under the microscope has also shown the existence of numerous hairs from the skin, which could only be drawn in with the liquor amnii. But nutrition exists in monstrosities in which the mouth is absent and also in the early months of intrauterine life when deglutition is impossible, so that if the liquor amnii fulfills any nutritive purpose at all it is very slight compared with that of the placenta.

D. *Secretions.*—The skin furnishes the vernix caseosa which at the moment of birth covers the fœtus like an irregular false membrane.

The intestine secretes the meconium, a mixture of bile, cellular debris and different elements found in the liquor amnii. Except under special conditions, the meconium is only expelled after birth.

The kidneys also act during pregnancy. The urine accumulates in the bladder, and then passes into the liquor amnii. Obliteration of one of the ureters produces hydronephrosis, and that of the urethra, retention of urine with distention of the bladder—a proof of the existence of micturition during intra-uterine life.

E. *Innervation and motility.*—Sensibility and motility exist in the fœtus, every excitation conveyed to it is interpreted by movements. It is also probable that during intra-uterine life there are alternatives of sleeping and waking.

CHAPTER III.

MODIFICATIONS OF THE MATERNAL ORGANISM.

We have studied the ovum during its development in the uterine cavity, it is now important to study the parallel modifications which occur in the maternal organism. These modifications are not localized, as might be supposed, in the genital system, but involve the whole economy. It will then be necessary to successively examine all the systems. I shall begin with the genital apparatus as the one most directly interested.

I. *Genital system and vicinity.*—Some special anatomical considerations are necessary to a proper understanding of this subject.

The *uterus* is the organ in which the ovum is developed during normal pregnancy. Situated in the pelvic cavity, with the rectum behind and the bladder in front, it unites the vagina to the tubes.

The general form of the uterus is that of a pear, the large extremity constituting the body, the small the cervix. The body and the cervix are united by a thinner part, the isthmus. In the normal state the axis of the uterus is rectilinear, that is, the body and the cervix have the same direction. This uterine axis is nearly identical with that of the superior strait and is perpendicular to that of the vagina. However, the axis of the uterus is perpendicular to that of the vagina only when there is a certain degree of repletion of the bladder. But, after the evacuation of the urine, ante-deviation occurs. Thus the uterus lies on a cushion of water and follows its variations. The uterus is held in its normal position by by the support given to it by the pelvic floor.

The longitudinal dimension of the uterus is six centimetres and a half, which is divided as follows:

Cervix,	0,025
Isthmus,	0,005
Body, cavity,	0,025
Thickness of the wall,	0,010
	0,065

These dimensions represent the average as applied to all uteri. It should not be forgotten, however, that in the nulliparous woman the cavity of the cervix is greater, and in the multiparous that of the body.

Weight: forty grammes.

The uterus is covered by the peritonæum in the greatest part of its extent except over the three regions shown in Fig. 65. This membrane separates it from the bladder in front, from the intestines above and from the rectum behind. The fundus of the uterus is situated about three centimetres above the horizontal plane passing through the superior portion of the symphysis pubis.

I have already described the interior of the uterus under head of menstruation and it is sufficient to say here that the external orifice is rounded and sometimes punctiform in the nulliparous woman, that it is transversely elongated after a first parturition, and that, in consequence of multiple lacerations, it may have a stellate or an irregular appearance.

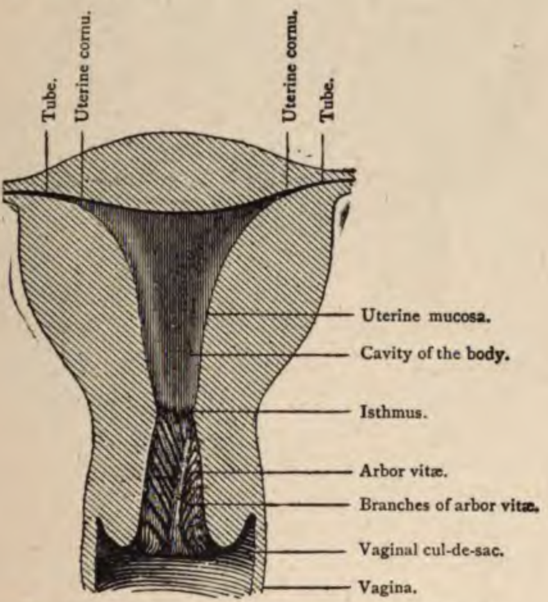


FIG. 63.—Vertical and transverse section of the uterus.

The uterus is composed of an important muscular coat, incompletely covered by a serous membrane, and lined on its interior by a mucous covering that we have already studied. The muscular tunic is exclusively composed of non-striated fibres. It differs in the body, in the isthmus and in the cervix.

Body.—Fig. 67 schematically represents this structure. In the center, forming the framework, is a plexiform layer formed by interlacing muscular fibres with the meshes occupied by the arteries and the veins which dilate during pregnancy to form veritable sinuses. Above this plexiform layer is the superficial muscular layer comprising an antero-posterior loop, which, commencing at the isthmus in front, follows the median line of the uterus to terminate behind at a corresponding point. Then there comes a series of transverse fibres, which are prolonged in part into the broad ligaments. Beneath is the deep muscular layer, also comprising two arrangements

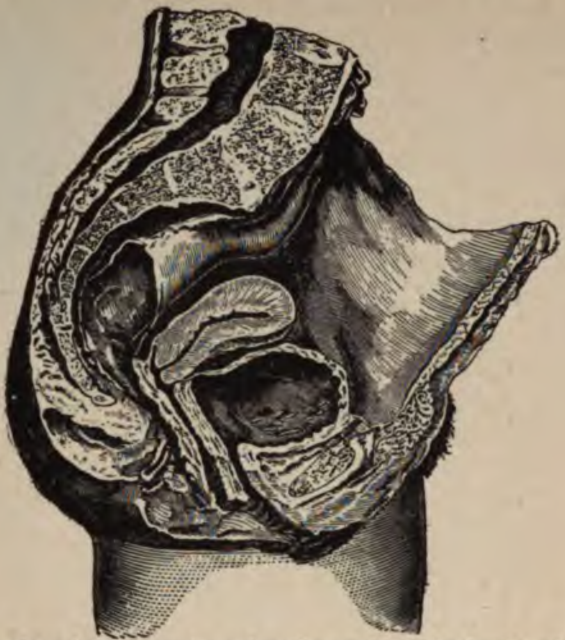


FIG. 64.—Antero-posterior and median section of the female pelvis.

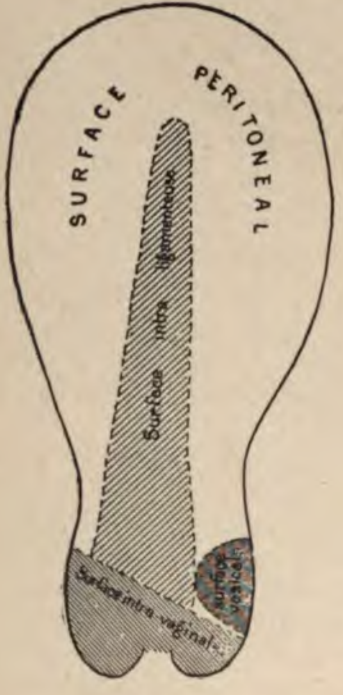


FIG. 65.—Profile view of the uterus.

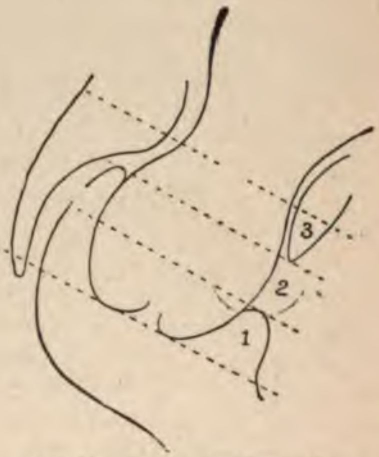


FIG. 66.—Relations of the cervix (Schroeder).

of fibres; one transverse, forming a series of irregular rings, the others in the form of a Z. This series of fibres in the form of a Z are directly in contact with the mucosa.

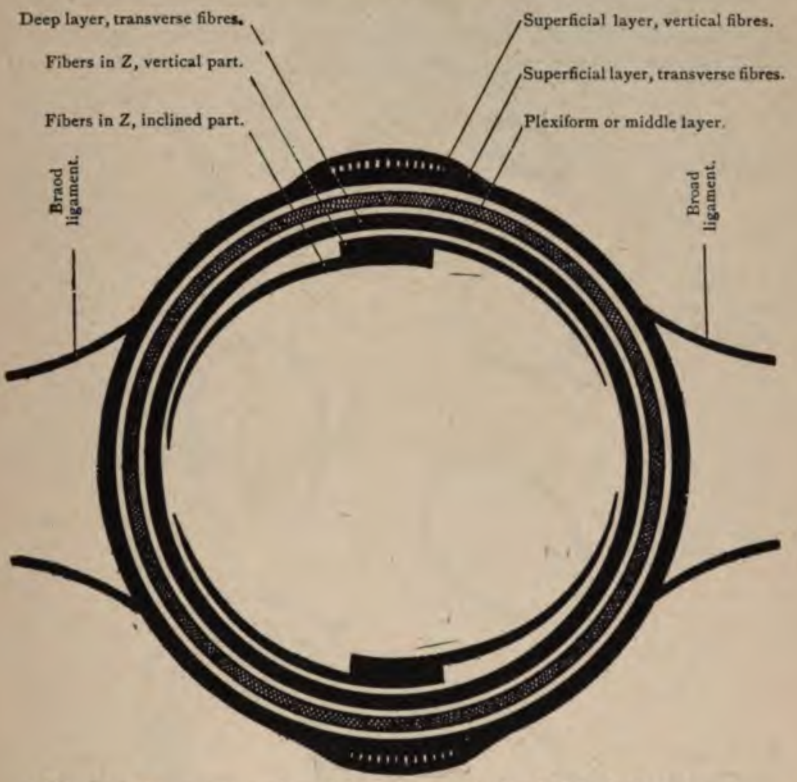

Deep layer, transverse fibres.
Fibers in Z, vertical part.
Fibers in Z, inclined part.
Superficial layer, vertical fibres.
Superficial layer, transverse fibres.
Plexiform or middle layer.
Braod ligament.
Broad ligament.

FIG. 67.—Transverse section of the uterus, at the level of the body (schema).

Isthmus.—In the isthmus we only find transverse or slightly oblique fibres, that is, the plexiform layer does not reach here, but only the superficial loop fibres and those in the form of a Z.

Cervix.—The same is true of the cervix, but there is, however, difference between the isthmus and the cervix, as in the latter the connective tissue element predominates while in the isthmus the muscular fibres are more abundant.

These anatomical considerations permit us to pass to the study of the modifications of the uterus under the influence of pregnancy. These modifications are of three kinds:

A. Macroscopic.
B. Microscopic.
C. Physiological.

A. *Macroscopic modifications.*—The body containing the ovum and the cervix opposing its egress, assume a physiological role essentially different. The modifications of these two parts of the uterus are completely dissimilar, from which arises the necessity of studying them separately.

1. *Modifications of the body.—Volume.*—I shall only speak of the vertical diameter, which measures fourteen centimetres at the third month (not including the cervix); twenty-one in the sixth month, and thirty-five in the ninth month.

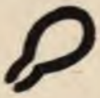


FIG. 68.
Uterus empty (profile view).

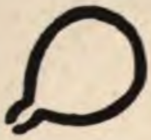


FIG. 69.
First three months of pregnancy (uterus rounded).

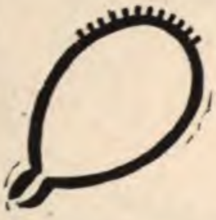


FIG. 70.
Second three months of pregnancy.

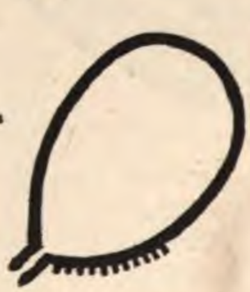


FIG. 71.
Third three months of pregnancy.

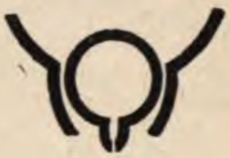


FIG. 72.
First three months. Uterus in pelvis (front view).

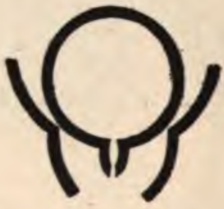


FIG. 73.
Second three months. Uterus in abdomen.

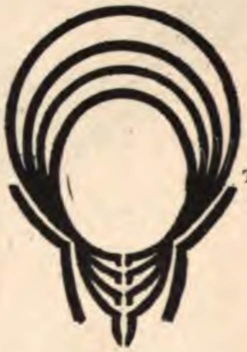


FIG. 74.
Third three months. Abdominal-pelvic situation.

Capacity.—The capacity of two to three cubic centimetres in an empty state is increased to four or five litres.

Form.—The uterus becomes rounded during the first three months of pregnancy, while increasing in volume. During the second three months, the uterus especially increases in its postero-superior part, in the region indicated in Fig. 70, by a series of small projections, in such a manner that the openings of the tubes are carried below and a little forward. During the last three months it is especially the antero-inferior part which develops, in such a way that the cervix is thrown backward. The general form of the uterus at term is, as before pregnancy, that of an ovoid with the small extremity downward.

Situation.—During the first three months of gestation the uterus is developed in the interior of the pelvic excavation. The fundus passes the superior strait and encroaches on the abdominal cavity (Fig. 71).

In the second three months the uterus, becoming too large for the pelvic cavity, ascends into the abdominal cavity above the superior straight (Fig. 73).

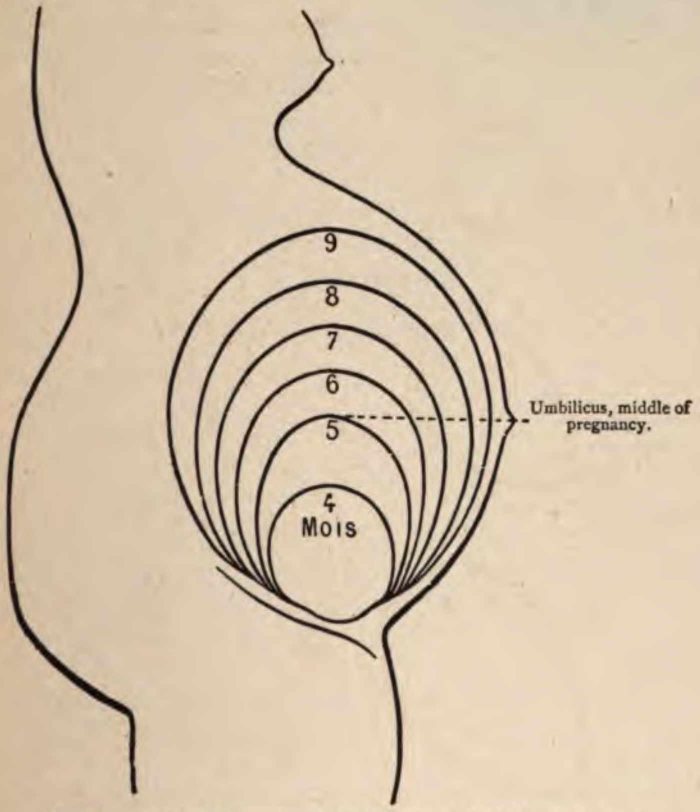


FIG. 75 —Gradual elevation of the uterus in the abdominal cavity.

During the last three months the situation of the uterus varies in the primiparæ and in the multiparæ. In the primiparæ, early descent of the uterus into the pelvic excavation, with engagement of the fœtal part, takes place, especially during the last two months (Fig. 74). In the multiparæ the lax abdominal wall allows sufficient room for the distention of the uterus, and engagement only occurs during the last fifteen days of pregnancy, sometimes even later.

The relation of the fundus of the uterus to the abdominal wall (Fig. 75) is interesting to determine, for it serves as a mark from which an approximate estimation of the date of the pregnancy may be made. Unfortunately, great variations exist. However, it may be said in a general way that:

During the fourth month the uterus is a little below the umbilicus; during the fifth, at the level of the umbilicus; during the sixth, a little above the umbilicus; during the seventh, three fingers' breadth above the umbilicus; during the eighth, six fingers' breadth above the umbilicus, and during the ninth month, nine fingers' breadth above.

Orientation.—The uterus presents three principal axes, an antero-posterior, a vertical, and a transverse. Now, during pregnancy, it may undergo various deviations by turning on these axes.

1 *Antero-posterior axis.—Lateral inclination.*—I suppose this axis passing in the vicinity of the cervix. Movements of the uterus around this fictitious line incline its fundus to the right or to the left. From the statistics of one hundred cases I have deduced the following:

Right inclination, 55 per 100.
Left inclination, 5 per 100.
No inclination, 40 per 100.

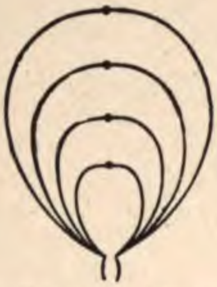


FIG. 76.—Median uterus, symmetrical development of the two halves of the organ.

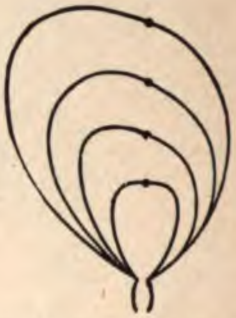


FIG. 77.—Apparent inclination of the uterus, asymmetrical development of the of the two halves of the organ.

Various causes have been invoked to explain this lateral inclination of the uterus; among them are: Decubitus, preponderant usage of the right or of the left arm, the situation of the placenta, the relative length of the round ligaments, the anatomical disposition of the mesentary, and vesical or rectal repletion. But none of these explanations are satisfactory, and it seems the mode of development of the uterus, either symmetrical or asymmetrical, affords a better account of these lateral deviations. The symmetrical development of the two halves of the organ gives a uterus which appears median (Fig. 76), while asymmetrical development imposes a right (Fig. 77) or a left inclination. Thus the inclination of the uterus is apparent and not real. If real inclination occur, it is consecutive to the preceding.

2. *Vertical axis.*—Rotation is the movement round the vertical axis. The anterior surface of the uterus is generally inclined toward the side where the organ is most developed. This rotation is important with regard to a Cæsarian operation, for if the direction is not corrected there is danger of wounding some important vessels.

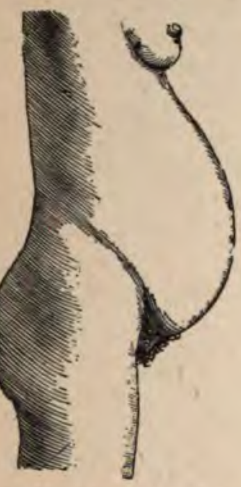


FIG. 78.—Normal gravid abdomen.

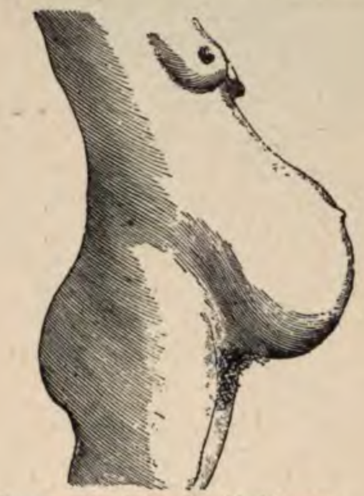


FIG. 79.—Pendulous gravid abdomen.

3. *Transverse axis.—Antero-posterior inclination.*—I suppose this axis passing through the union of the body and cervix. During the first three months, rarely later, the body of the uterus may incline backward, thus constituting retroversion of the gravid uterus, which we shall study further on. During the latter part of pregnancy this posterior deviation is impossible, on account of the size of the uterus, but anteversion may occur with a very lax abdominal wall (Fig. 79).

Weight.—Thickness.— The weight of the uterus attains about a kilogramme at term (not including the fœtus). The thickness of the uterus is, normally, five millimetres. Opinions on this subject differ greatly. Some authorities say it is thinner, some that it is thicker, and some that it remains the same during pregnancy, and all have autopsies to bear them out. These different observations demonstrate the inconsistency of its thickness. There exists in general a notable difference between the superior segment and the inferior, the latter being relatively very thin. Points of the uterus which have supported a prolonged compression, like that of the fœtal head, are diminished in thickness. The surface of the insertion of the placenta is hypertrophied, on the contrary.

2. *Modifications of the cervix.*—The cervix is modified in its form, in its situation, in its volume and in its consistence. The effacement, that is, the disappearance of the cervix which precedes the

opening of the external orifice, although sometimes occurring during pregnancy, will be studied with accouchement.

FIG. 80.

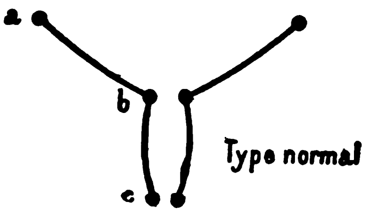


FIG. 81.

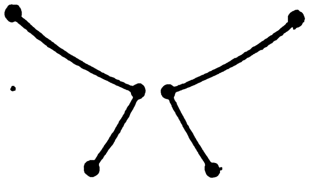


FIG. 82.

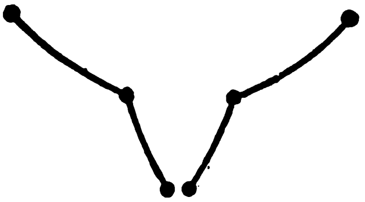
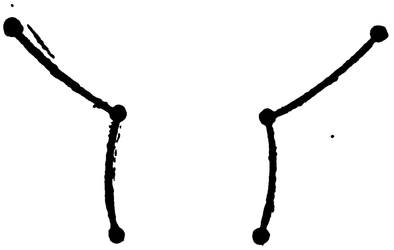


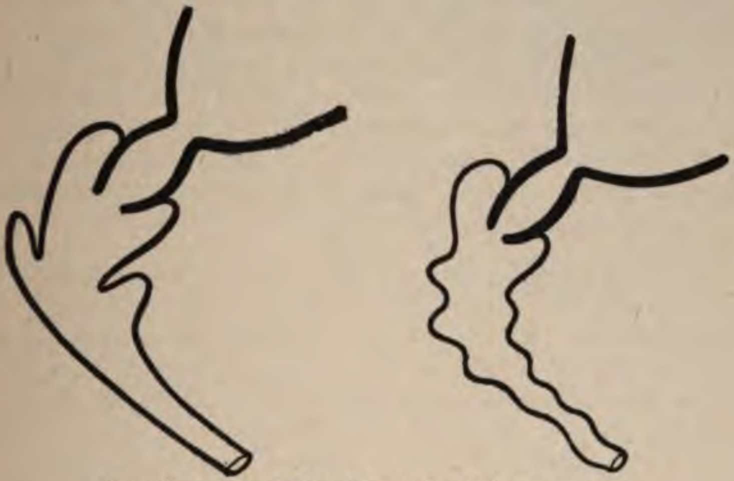
FIG. 83.



a, uterine circle (Bandl's ring) limit between the supero-lateral and inferior segments; b, internal orifice; c, external orifice.

Form.—Outside the modifications of form caused by effacement there may be found, aside from the normal type often persisting in the primiparæ, one of the three principal forms represented in the adjoined schema (Figs. 80, 81, 82 and 83). These modifications are due to the degree of the relative dilatation of the two orifices of the uterus.

Situation.—The cervix naturally follows the body in its evolutions. During the first three months the cervix is found in its natural position, often a little approached to the perinæum. During the second three months the cervix follows the uterus in its ascent and becomes less accessible to vaginal touch. During the last three months its situation differs in the primipara from that in the multipara. In consequence of the progressive engagement during the last three months in the primipara, the cervix descends and is also usually deviated to the left and a little backward. Rarely the cervix is median or to the right. In the multiparæ, engagement takes place later, and the situation of the cervix varies with degree of the uterine descent. With regard to cervical deviations, they are the same as in the primiparæ.



FIGS. 84 and 85.—Folds of the vagina during pregnancy.

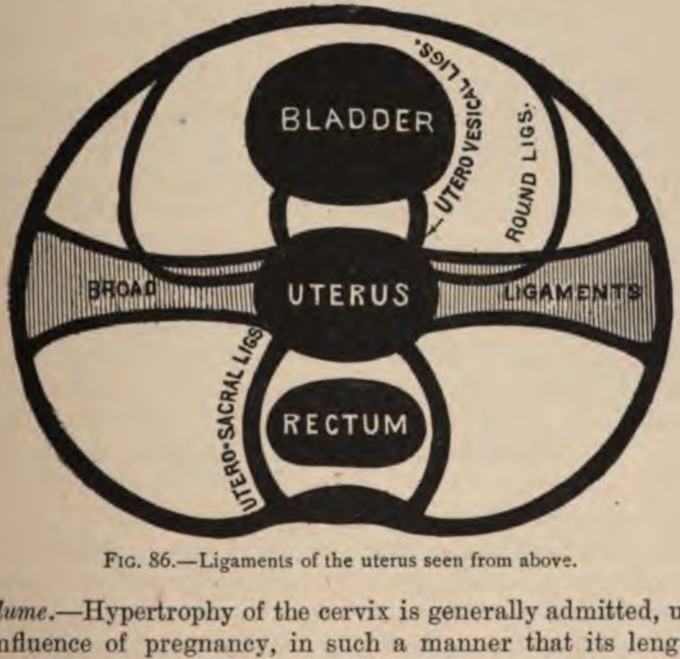


FIG. 86.—Ligaments of the uterus seen from above.

Volume.—Hypertrophy of the cervix is generally admitted, under the influence of pregnancy, in such a manner that its length is doubled; from twenty-five millimetres it is increased to five centimetres. We shall return to this apropos of effacement.

and by contraction justifies the special nature attributed to sensibility.

ıe uterus is irritable, that is to say that an excitation arising ensitive zone is transmitted to the uterus reflexly and causes action. The majority of the methods employed to cause ı act by bringing this property of the uterus into play.

ctensibility permits the uterus to distend progressively with lopment of the product of conception. Without it pregnancy be impossible. During gestation the body of the uterus es extension; at the moment of labor the cervix and the segment are extended in turn.

tractility is opposed to extensibility. By this property the ıas a tendency to diminish in volume, like a rubber balloon. ility is only the effect of the tonicity possessed by the uterus non with all other muscles. Pathological exaggeration of lity produces uterine tetanus and its absence creates uterine

ntractility is constituted by the momentary contraction of us as a whole. It results in a diminution of the capacity rgan or in a tendency to this diminution. In an empty the uterus contractions are painless and are not felt except logical conditions, such as pseudo membranous dysmenor- During pregnancy they are also painless, and if they are d at all it is as a passing hardness of the abdomen. On the y, contractions become painful during labor.

agina.—Vulva.—Perinæum.—These structures undergo two l modifications, hypertrophy and softening, occurring in ı with the same changes in the uterus, thus preparing a le condition for the exit of the child.

gina.—The vagina increases in all its dimensions. Its on facilitates, in the second three months of pregnancy, nsion of the uterus. When, during the last three months, rus descends again the vagina, is folded on itself (Figs. 84 . The vascular system undergoes an equal development, he double effect of modifying the coloration of the vagina making the arterial pulsations perceptible in some cases l pulse of Osiander).

ılva.—Besides hypertrophy and a certain degree of softening a undergoes two other important modifications. A pigmen- nalogous to that of the breast or of the face and a violaceous on, more marked on as the vagina is approached.

erinæum.—The perinæum, participating in the softening and ypertrophy of the tissues of the genital zone, acquires under the influence of pregnancy a great suppleness permitting stretching at the moment of accouchement. Like the vulva, it often becomes the seat of pigmentation, especially in brunettes.

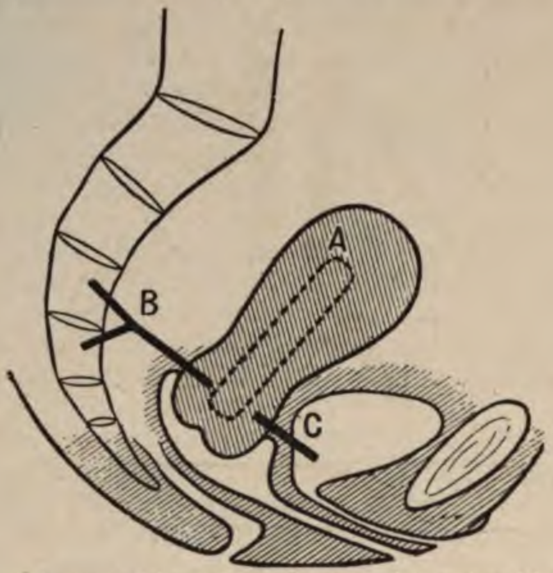


FIG. 87.—Ligaments of the uterus, profile view. A, insertion of the broad ligaments; B, utero-sacral ligament; C, utero-vesical ligament.

III. *Appendages of the uterus.*—I shall study the modifications of the ligaments with the enclosed vessels, by describing the modifications impressed on them by pregnancy.

A. *Ligaments.*—During pregnancy all the ligaments undergo a notable hypertrophy with a certain degree of softening, as in all the organs of the genital zone. The suppleness acquired by the utero-sacral ligaments permit the ascension of the cervix during the second three months of pregnancy. With regard to the broad ligaments, the contraction of their muscular fibres play, according to the demonstrations of Thevenot and Budin, an important role in the engagement of the uterus and of the fœtal part. Their contraction, synergetic with the pressure exercised by the abdominal wall, causes the fœtus to descend into the excavation; their relaxation permits the ascension of the uterus.

The tube and the ovary, contained in the broad ligament, participate in the general hypertrophy of the genital system. The ovary in particular, which has furnished the fecundated vesicle, sometimes acquires the volume of a small walnut. Budin has justly insisted on the pain which is often caused by palpation of the ovaries during pregnancy.

B. *Bloodvessels.*—The adjoined plate brings these structures to memory sufficiently without necessitating further description. All these vessels, especially the veins, assume a considerable development during gestation.

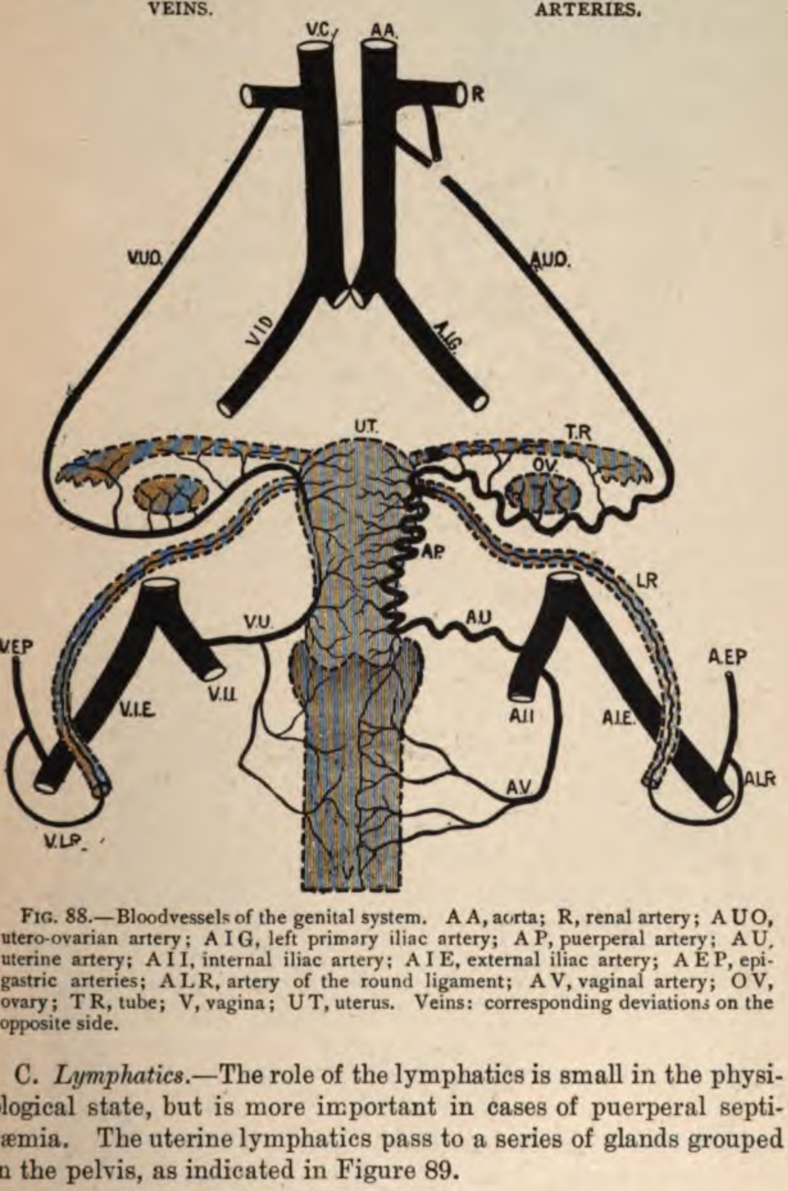


FIG. 88.—Bloodvessels of the genital system. A A, aorta; R, renal artery; A U O, utero-ovarian artery; A I G, left primary iliac artery; A P, puerperal artery; A U, uterine artery; A I I, internal iliac artery; A I E, external iliac artery; A E P, epigastric arteries; A L R, artery of the round ligament; A V, vaginal artery; O V, ovary; T R, tube; V, vagina; U T, uterus. Veins: corresponding deviations on the opposite side.

C. *Lymphatics.*—The role of the lymphatics is small in the physiological state, but is more important in cases of puerperal septicæmia. The uterine lymphatics pass to a series of glands grouped in the pelvis, as indicated in Figure 89.

IV. *Articulations of the pelvis.*—The three articulations which especially fix the attention are the two sacro-iliac symphyses and the symphysis pubis. As a whole, they may be considered as three breaks in the pelvic ring which give it greater flexibility. This appears to be their special use. Under the influence of pregnancy the peripheral ligaments of these articulation relax, and the intra-articular ligaments undergo a certain degree of softening with hypertrophy. These modifications cause a slight separation of the articular surfaces.

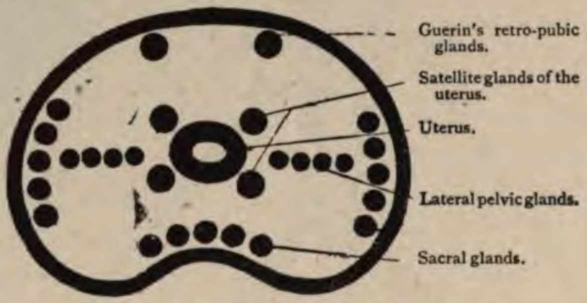


FIG. 89.—Lymphatic glands of the pelvis.

V. *Abdominal wall.*—The umbilicus seems deeper during the first three months of pregnancy, as if the urachus exercised traction at this point. Beginning with the second three months the umbilicus is progressively flattened and often becomes projecting in the last three months. These three periods of the changes in the umbilicus have only a theoretical interest.

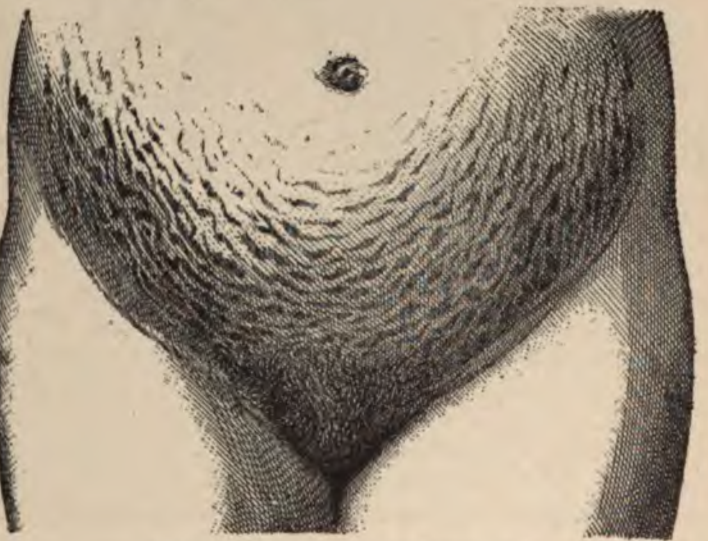


FIG. 90 —Lineæ albicantes of pregnancy.

The abdominal integument, distended by the enlarging uterus, presents a series of subepidermic cracks, forming small plaques of cicatricial appearance. These are the lineæ albicantes of pregnancy. These vibices particularly occur in the subumbilical region and parallel to the fold of the groin. They may also invade the whole extent of the abdomen, sometimes even the buttocks and upper part of the thighs. By anomaly, they are exclusively situated in one of these two regions. They are rosy or bluish when recent; in multiparæ those dating from a previous pregnancy have a pearly reflex. They diminish in extent after pregnancy, but never disappear entirely. In five cases out of one hundred they are wanting. These subcutaneous ruptures are not exclusively observed during pregnancy; they may be produced by any cause of abdominal distention.

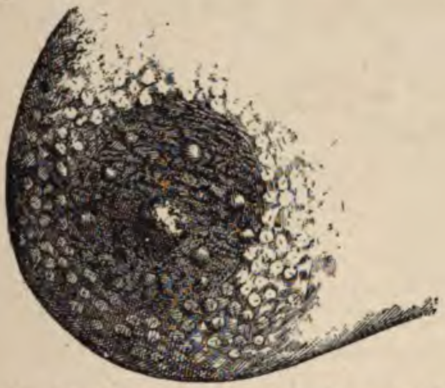


FIG. 91.—Nipple. True and secondary areolæ. Tubercles of Montgomery.

6. *Breasts.*—We will only touch here upon the question of the superficial changes of the nipple, the areola, and of the contiguous integument. The nipple increases in size, becoming erectile and sensitive, even hyperæsthetic and painful. Around the nipple there are two zones of unequal coloration, the most eccentric being the least deeply colored. The first is the true areola, existing before pregnancy and becoming more pigmented under its influence. The hypertrophy of Mongomery's tubercles and the pigmentation are the two principal characters of the areola during gestation. The other, the secondary areola, is a pigmentation of gravid origin, and forms a circle surrounding the first. The subcutaneous venous plexus becomes very apparent. By compressing the nipple toward the end of pregnancy some drops of colostrum often exude. The colostrum sometimes flows spontaneously.

II. *Nervous system.*—A. *Central.*—The sensitiveness of the pregnant woman is usually exaggerated. The intelligence is also affected, so that a naturally vivacious woman becomes dull when pregnant. Exceptionally, a contrary modification has been noted. Various perversions in the form of morbid desires are to be noted. Alterations of the will are also often present and border on insanity in some cases.

B. *Peripheral.*—Pregnancy predisposes to diverse neuralgias, and in particular to odontalgia, especially in women whose dental system presents a previous physiological inferiority.

III. *Respiratory system.*—The development of the uterus causes an increase in the transverse diameter of the thorax, and on the contrary a diminution of the antero-posterior and of the vertical. The general capacity of the thorax is diminished, producing a certain obstruction to respiration, that is increased by the globular poverty of the blood, another effect of pregnancy that we shall soon explain. This double cause exposes the pregnant woman to breathlessness.

IV. *Circulatory system.*—*Blood.*—There are three principal modifications of the blood, namely, serous plethora, globular anæmia (except as to the leucocytes), and diminution of the solid principles (except fibrin). The quantity of water composing the blood is notably increased, so that the total mass of the sanguineous liquid is greater during pregnancy. There is then a plethora, but a serous plethora or hydræmia. From the exaggeration of the vascular tension there arises in the capillaries a quantity of serum, causing a generalized swelling of the tissues. This swelling should not be confounded with a certain degree of adipose tissue which is a frequent result of pregnancy as we shall see later.

Besides the general infiltration of the tissues the augmentation of the total amount of blood has two other effects: predisposition to hæmorrhages and obstruction of the functions of certain organs, in particular, of the heart (hypertrophy, dilatation) and of the kidney (congestion, nephritis, albuminuria). The greater vascular tension produces more energetic pulsation on the part of the arteries and a tendency to dilatation on the part of the veins, frequently terminating in the production of varices.

V. *Urinary system.*—In the kidney we find congestion and obstruction due to the general modifications of the circulation and to the compression exercised by the voluminous uterus. From this arises a predisposition to nephritis and disturbances of secretion, which will be studied with the urine.

Compression of the ureter is possible, especially when the engagement is deep, leading to arrest of the flow of urine and the production of eclampsia.

In its development the uterus obstructs the bladder more or less by its expansion, and causes changes in the form and in the situation of the urinary reservoir. During the first three months of pregnancy the conditions are not notably changed. During the second three months, the bladder is considerably relieved from pressure by the ascent of the uterus. During the third three months, and also during labor following the degree of the fœto-uterine engagement, the bladder takes different forms (Figs. 92, 93, 94). The urethra follows, in part, the changes of the bladder.

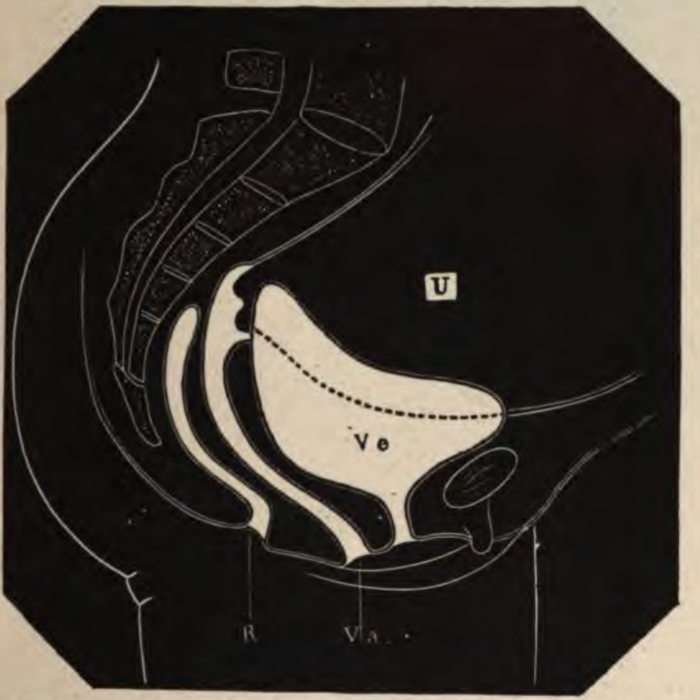


FIG. 92.—Bladder in the form of a crescent. V e, bladder; U, uterus; R, rectum: V a, vagina.

The urine undergoes three principal modifications, an augmentation in the quantity of water, diminution of the solid elements (except the chlorides), and appearance of new elements (kiestine, albumin, glycose). The augmentation of the liquid portion is only relative, for the total quantity of urine is nearly the same during the pregnant state as in the normal condition. The diminution of the solid elements comprises the phosphates, sulphates, urea, uric acid, creatine and creatinine. The chlorides alone are increased. Under the term kiestine has been designated a special substance which appears on the surface of the urine of pregnant women. The presence of albumen is relatively rare; I shall return to this subject under albuminuria. Apropos of glycosuria, authorities are not in accord. I reserve this subject for the chapter on diabetes.

VI. *Cutaneous and osseous systems.*—Besides the different situations already noted, gravid pigmentation may occur in various other parts, notably on the face. The nutrition of the nails may be

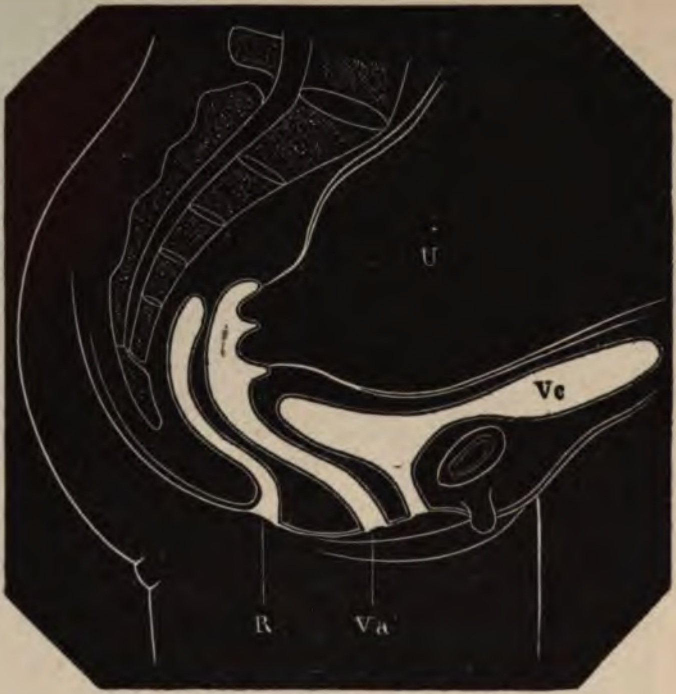


FIG. 93.—Bladder in the form of a slipper.

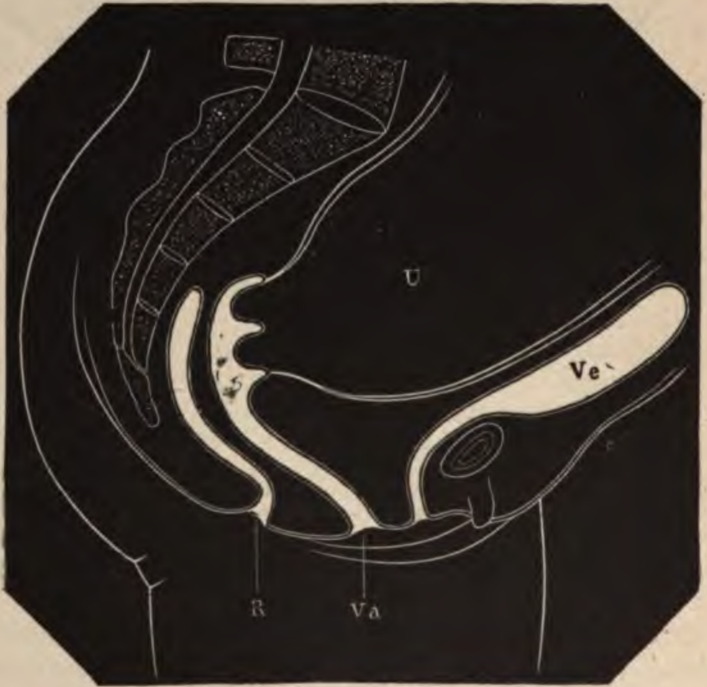


FIG. 94.—Bladder in the form of a horn.

disturbed, causing a diminution in their thickness. The skeleton undergoes modifications in its general attitude and in its nutrition. In consequence of the development of the abdomen, the woman to maintain her equilibrium is obliged to throw the upper part of the body backward. The puerperal state also seems to excite osseous development, as under its influence there has been noted on the internal surface of the cranium, and more rarely on the internal surface of the pelvis, the production of osteophytes in the form of plaques which arise with pregnancy and disappear with it.

VII. *Digestive system and appendages.*—The liver undergoes an augmentation in volume and a fatty degeneration especially marked in the centre of the hepatic lobule. With regard to the digestive system, it is subjected to very important modifications which react in a marked manner on the nutrition. Gestation is capable of disturbing more or less deeply each one of the four acts of nutrition.

1. *Absorption.*—Sometimes the appetite is excited under the influence of pregnancy, digestion is more easily accomplished and absorption seems thus favored. But usually an opposite modification is seen, so that a retardation of absorption can be considered the rule during gestation. Other causes contribute to the retardation of absorption, such as vomiting and diarrhœa.

2. *Assimilation* is generally lessened under the influence of pregnancy, and this exercises a most unfavorable action on scrofulosis and anæmia. Scrofula already exercises an unfavorable action on nutrition and pregnancy; by exaggerating this nutritive disturbance pregnancy hastens the evolution of tuberculosis. Aside from scrofulosis, the anæmia resulting from gestation sometimes becomes so marked that it constitutes a grave disease.

3. *Disassimilation.*—If this process is complete, only three waste products result, that is, urea, carbonic acid and water. But if disassimilation is incomplete, different products arise among which I shall note uric acid, lactic acid, sugar and fat. The excess of these products in the blood, or in the eliminative organ (urinary or biliary passages), produces the different diseases indicated by the following table:

Excess of lactic acid causes	Rheumatism, Osteomalacia.
Excess of uric acid causes	Gout, Urinary gravel.
Excess of fat causes - -	Obesity. Biliary lithiasis.
Excess of sugar causes -	Glycæmia. Glycosuria, Diabetes.

Now, pregnancy favors the development of the different diseases by retarding the disassimilative stage of nutrition.

4. *Elimination* occurs through the skin, the intestine (comprising

its tributary glands, the liver in particular), the lungs and the kidneys. We have seen that the analysis of the gravid urine shows a diminution of the solid elements (except the chlorides). Renal elimination is lessened then, and it is probable that the same is true with regard to the pulmonary, cutaneous and intestinal elimination. When this retardation of elimination becomes too marked, it terminates in a pathological state, *eclampsia.*

CHAPTER IV.

THE PARTURIENT CANAL.

The parturient canal is a narrowed and irregular region through which the fœtus must pass at the moment of delivery. This canal is constituted by an osseous region, which forms its framework, the bony pelvis, and is completed by the soft parts below, which as a whole may be called the soft pelvis or perinæum.

I. *Bony pelvis.*—The pelvis is formed by the two iliac bones, adherent at the symphysis pubis, and reunited posteriorly by the intermediate sacrum with its inferior appendix, the coccyx. This sketch allows us to note four articulations, the symphysis pubis in front, the two sacro-iliac symphyses, one on each side of the sacrum, and finally the sacro-coccygeal articulation. The pelvic ring, interposed between the vertebral column and the lower members, plays an important physiological part. In its description I shall confine myself exclusively to the obstetrical side of the question.

External conformation.—The exterior of the pelvis interests the obstetrician but little; however, as in certain vices of conformation the measurement of some external diameters furnishes useful knowledge, I shall indicate four of these:

1. The sacro-pubic, from the spinous process of the first sacral vertebra to the anterior and median part of the symphysis pubis, twenty centimetres.

2. The bispinous, separating the two anterior superior iliac spines, twenty-four centimetres.

3. The bis-iliac, uniting the two most distant points of the iliac crests, twenty-eight centimetres.

4. The bitrochanteric, from the great trochanter of one side to that of the other, thirty-two centimetres.

Internal conformation.—In its interior the pelvis presents two absolutely distinct regions, separated by a retraction that constitutes the linea-ilio-pectinea completed behind by the promontory, and to which is given the term superior strait. Above this is found the great or false pelvis; below it is the true pelvis.

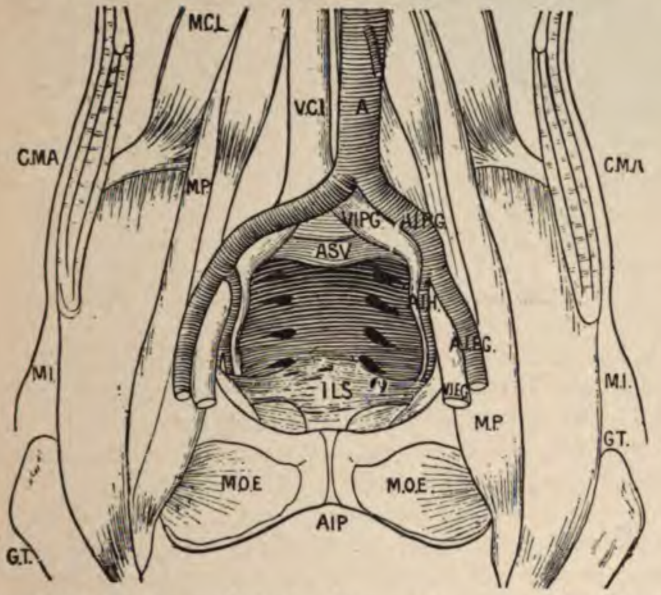


FIG. 95.—False pelvis covered by the soft parts. A, aorta; A I P G, left primary iliac artery; A I E G, left external iliac artery; M P, psoas muscle; C M A, section of the muscles of the abdominal wall; G T, great trochanter; M I, iliac muscle; M C L, quadratus-lumborum muscle; V C I, inferior vena cava; V I P G, left primary iliac vein; A S V, sacro-vertebral angle; I L S, insertion of sacro-sciatic ligaments; M O E, external obturator muscle; A I P, inferior arch of the pubes.

The false pelvis forms an incomplete funnel, constituted by the iliac wings laterally, and the spinal column behind. The ilio-psoas muscles, by filling the iliac fossæ, offer a support to the gravid uterus when it inclines to one side.

But the true pelvis is essentially the obstetrical part of the pelvis. It is limited above by the superior strait, already defined, and below by the inferior strait (point of the coccyx, inferior part of the saco-sciatic ligaments, ischium, ischio-pubic rami, inferior part of the pubic symphysis).

Between these two straits is found the pelvic excavation. At the inferior part of the excavation a contracted portion, the median strait, divides it into two unequal parts: one, superior, the great excavation; one, inferior, the small excavation.

The median strait is of considerable importance in obstetrics. It constitutes the limit between the bony pelvis and the muscular pelvis; above it, the fœtus passes through a bony canal; below it, through a muscular canal. Above it lies pelvic dystocia; below it (except in obstacles furnished by the ischium and coccyx) we have perinæo-vulvar dystocia.

For complete recognition of the true pelvis it is necessary to describe successively:

a. The superior strait.
b. The great excavation.
c. The median strait.
d. The lesser excavation.
e. The inferior strait.

a. Superior strait.—Formed by the promontory, projecting part of the wings of the sacrum, innominate line of the ilium, ilio-pectineal eminence, pectineal surface, pubic spine, superior part of the pubis and of the symphysis pubis.

Diameters.—

1. *Antero-posterior* or *sacro-pubic*, eleven centimetres.

2. *Two oblique;* the *left* from the right sacro-iliac symphysis to the left ilio-pectineal eminence; the *right* from the left sacro-iliac symphysis to the right ilio-pectineal eminence. These two diameters are equal and measure twelve centimetres.

3. *A transverse*, uniting transversely the two most distant points of the innominate line, fourteen centimetres.

b. The great excavation, or *the Excavation, properly so-called.*—Formed by the sacral concavity, the great sciatic notch, the osseous surface extending from the ischium to the iliac wing, the obturator foramen, the posterior surface of the pubis and of the symphysis pubis.

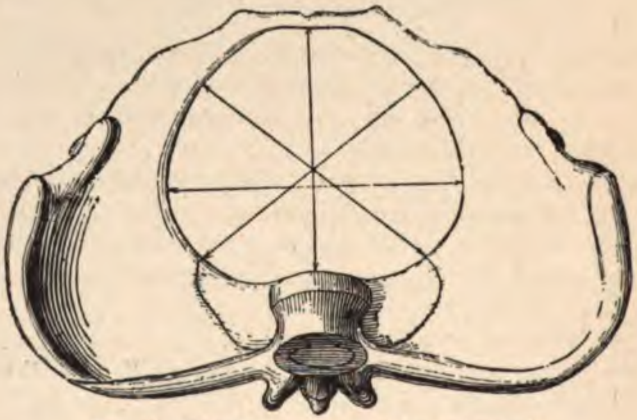


FIG. 96.—Pelvis: diameters of the superior strait.

Diameters.—

1. An *antero-posterior*, from the median part of the third sacral vertebra to the middle of the posterior inter-line of the symphysis pubis, twelve centimetres.

2. *Two oblique:* the left, better called the *cæcal,* from the middle of the right sciatic notch to the middle of the left obturator foramen; the right, better the *rectal,* follows an opposite direction; both measure twelve centimetres. However, the two extremities of these diameters, corresponding to soft parts, are easily extended to thirteen centimetres, and even more.

3. *A transverse:* from a point corresponding to the base of one cotyloid cavity to that of the other, twelve centimetres.

c. The median strait.—Formed by: the inferior part of the sacrum, the inferior border of the lesser sacro-sciatic ligament, the sciatic spine, a line from this spine to the inferior part of the pubic symphysis.

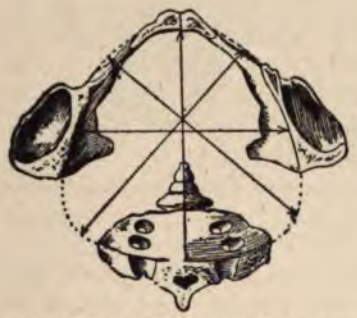


FIG. 97.—Pelvis: diameters of the excavation.

Diameters.—

1. *An antero-posterior,* from the inferior and median part of the sacrum to the inferior part of the symphysis pubis, twelve centimetres.

2. *Two oblique:* a *cæcal,* from the middle of the right lesser sacro-sciatic ligament to the middle of the ischio-pubic border and of the left obdurator foramen; a *rectal,* identical in the opposite direction. Both measure eleven centimetres.

3. *A transverse:* extending from the sciatic spine of one side to that of the opposite, ten centimetres.

d. e. Lesser excavation and inferior strait.—I unite these two regions in one description. Their importance is only secondary in relation to the preceding. The inferior strait, according to classical descriptions, is constituted by the point of the coccyx, the inferior border of the great sacro-sciatic ligament, the ischium, the ischio-pubic rami and the inferior part of the symphysis pubis. Now I shall remark:

1. That the great sacro-sciatic ligament does not extend to the point of the coccyx, but from the base of this bone to the ischium, so that the inferior strait is without limit in this region.

2. That the coccyx, from its mobility, plays the role of a soft part, its point consequently cannot serve to limit a fixed osseous strait, this would only be possible in ankylosis of the articulation of this bone with the sacrum, a pathological condition and relatively rare.

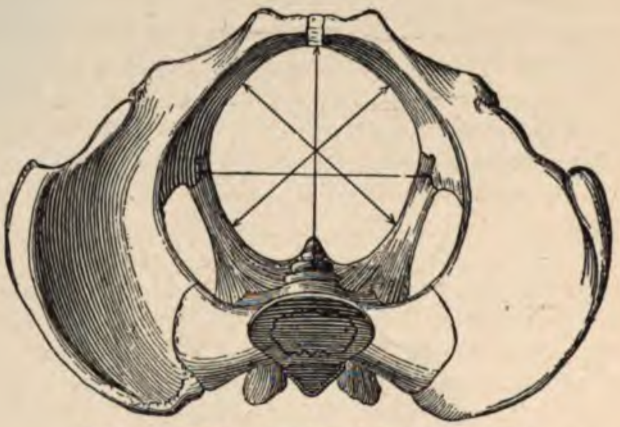


FIG. 98.—Pelvis: diameters of the median strait.

3. That the line uniting the ischiatic bones is found much above that going from the point of the coccyx to the inferior part of the symphysis pubis, and that for this reason these parts cannot contribute to the formation of a single plane.

4. That the coccy-perinæal muscle by its insertion rises above the inferior strait and removes almost all its importance, in an obstetrical point of view.

These different reasons argue for the acceptance of the median strait as the real limit of the excavation inferiorly. It conforms better to the reality to consider the inferior strait, not as a true strait, but as a simple osseous tripod, formed by the two ischiatic bones and the coccyx, these three projections being separated by three deep notches, the pubic in front, the sacro-sciatic laterally. It is comprehended then that a displacement (of the ischiatic bones) and a fixation (coccyx) may become a cause of dystocia. Thus it is well to know that in the normal state the distance which separates the two ischiatic tuberosities is eleven centimetres, and that which usually extends from the point of the coccyx to the inferior part of the symphysis pubis is nine centimetres, but is very extensible.

Placing in relation the dimensions of corresponding diameters we have:

Diameters.	Transverse.	Oblique.	Antero-posterior.
Superior strait	13	12	11
Excavation	12	12	12
Median strait	10	11	12

It will be seen then, by recalling that in the excavation the oblique diameters present a notable extensibility, that the great dimensions of the pelvis are:

Transverse at the superior strait.
Oblique in the excavation.
Antero-posterior at the median strait.

We can now, from these figures, foresee the situation of the fœtal head in its descent through the osseous canal. The head will place its greatest dimension, that is, the occipito-mental diameter, so that its position will be:

Transverse at the superior strait.
Oblique in the excavation.
Direct at the median strait.

II. *Soft pelvis.—Perinæum.*—The pelvic skeleton constitutes one of the most important muscular centers. Of these muscles some descend from the thorax to an insertion on its upper border; others are inserted on its external surface; finally, the last, which interest us more especially, are fixed to the internal surface of the pelvis, lining its walls and closing its inferior opening. Let us follow the latter muscles from the superior toward the inferior part of the pelvis. Above the superior strait, filling the iliac fossæ, are the psoas muscles, which we have already had in question. Below the superior strait, after having raised the pelvic aponeurosis, which forms a fibrous mass solidly closing the pelvis below, is found a most important muscular plane, lining the pelvis and also closing it below. The muscles thus uncovered (Fig. 99) are posteriorly the pyramidals; laterally and in front, the internal obturators, and finally, in the center of this large space is found the coccy-perinæal elevator, which it would be more simple to call the levator perinæi. The internal obturator passes, from its insertion around the obturator foramen, between the sciatic spine and the ischium to become fixed in the great trochanter. The pyramidalis, from its origin on the anterior and lateral surfaces of the sacrum, passes out through the great sacro-sciatic notch to become fixed on the great trochanter also. The coccy-perinæal elevator, or simply the perinæal, forms a trough, a hammock, transversely in the pelvis, attached laterally to the sciatic spine, to the pubis and to a fibrinous intersection which unites these two points. Posteriorly it is attached to the coccyx and to the inferior part of the sacrum while it is free in front and is limited by the posterior vaginal wall. It is on this hammock that the organs of the pelvis rest. This hammock supports the fœtal head, which depresses it in its passage to the vulvar orifice.

The levator possesses several fasciculi which by their union constitute one muscle. The first fasciculus, the ischio-coccygeal, extends from the sciatic spine to the lateral parts of the coccyx. The second fasciculus, the coccygeal, arising from the fibrous intersection between the sciatic spine and the pubis, has its fibres converging toward the point of the coccyx. The third fasciculus, the ano-vulvar, particularly resisting, arises in front at the inferior and posterior part of the pubis and forms a fan interlacing with the fibres of the opposite side, between the coccyx and anus for one part and the rectum and vagina for the other part; some fibres terminating on the lateral portions of the rectum and vagina.

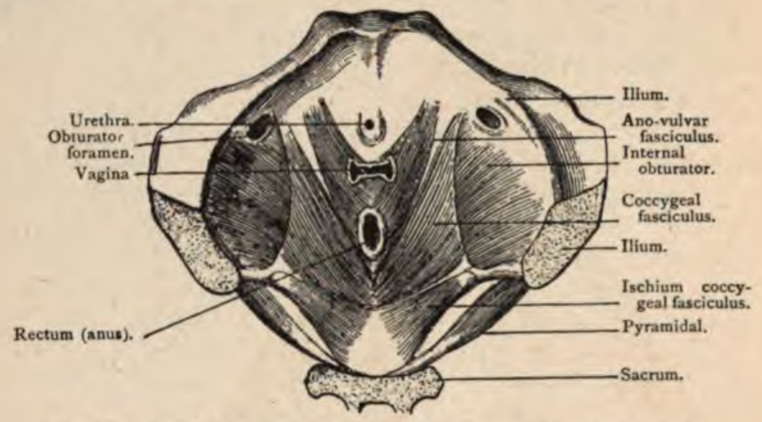


FIG. 99.—Pelvic diaphragm. Internal obturators. Pyramidial muscles. Coccy-perinæal elevator.

Examined as a whole, the fibres of this levator may be divided into three fans on each side, disposed in opposed directions: a sciatic fan, with the point at the sciatic spine and the base at the lateral border of the coccyx; a coccygeal fan, with the point at the extremity of the coccyx and the base at the fibrous intersection joining the sciatic spine and the pubis, and a pubic fan, with the point at the pubis and the base on the coccy-vulvar median line.

The coccyx is thus included in the muscle and forms a dependent portion. This bone, being mobile at its articulation with the sacrum, follows the fibres in their different movements. Thus, when the fœtal part distends the muscular mass the coccyx is pushed backward with the muscular fibres. This bone, a hard part in the static state, should be considered as a soft part in the dynamic state. This pushing back of the coccyx makes a portion of the amplification of the perinæum. It marks the beginning of the period of expulsion. It is the first obstacle met by the fœtal part at the beginning of this period. But this obstacle will usually be easily overcome, unless there is ankylosis of the sacro-coccygeal articulation. There then exists a veritable cause of dystocia.

The anterior portion of the levator perinæi, the part in contact with the posterior vaginal wall, may also become a cause of dystocia.

Budin, who has particularly studied this cause of dystocia, has clearly established the fact that this anterior portion of the levator may be an obstacle to exploration, to coitus, and to delivery.

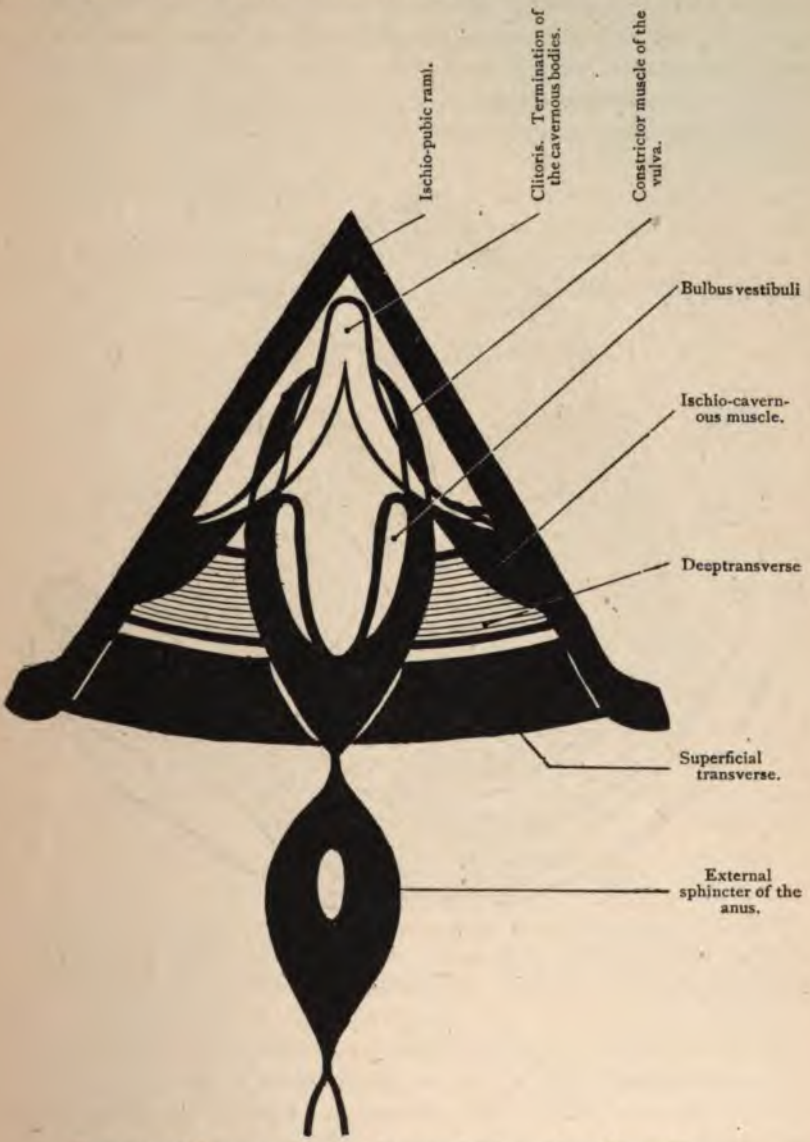

Ischio-pubic rami.
Clitoris. Termination of the cavernous bodies.
Constrictor muscle of the vulva.
Bulbus vestibuli
Ischio-cavernous muscle.
Deeptransverse
Superficial transverse.
External sphincter of the anus.

FIG. 100.—Schema representing the superficial muscles of the perinæum.

Thus constituted the levator perinæi is to the abdominal cavity (at the inferior pelvic opening) what the diaphragm is to the inferior thoracic opening. The perinæal elevator is covered and completed superficially by a series of muscles, which must be described in brief. Of these muscles, one surrounds the termination of the intestine; this is the external sphincter of the anus. The others are disposed around the vulva. They are:

1. The constrictor of the vulva, a muscular ring enveloping the vaginal bulbs. Its contraction produces inferior vaginismus.
2. The superficial transverse muscle, a muscular band thrown from one ischium to the other.
3. The deep transverse muscle, a simple muscular vestige passing from the ischio-pubic ramus to the corresponding bulb of the vagina.
4. The ischio-cavernous muscle, enveloping, along the ischio-pelvic rami, the root of the cavernous bodies.
5. Wilson's muscle, composed of some muscular fibres passing from the internal surface of the pubis to the urethra.

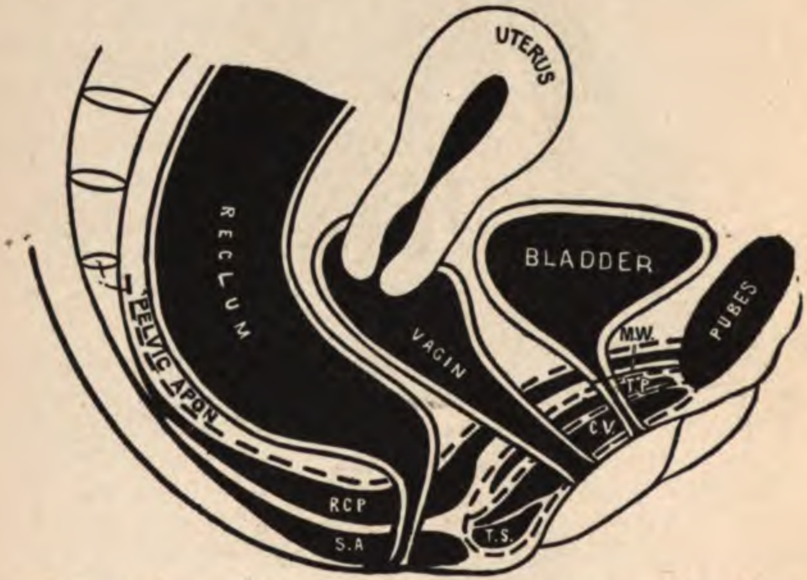


FIG. 101.—Antero-posterior section of the muscles and aponeuroses of the perinæum (Schema). M W, Wilson's muscles; T P, deep transverse; C V, vulvar constrictor; T S, superficial transverse; R C P, coccy-peritonæal elevator; S A, anal sphincter (external sphincter).

Thus we have two muscular planes constituting the perinæum: A *deep* plane, consisting of the perinæal elevator, which is, consequently, the pelvic diaphragm; a *superficial* plane, represented by the muscles subjacent to the skin. Through these tissues pass vessels and nerves. Thus comprised, the perinæum gives passage to three important organs, the rectum behind, the urethra in front and the vagina in the middle. To terminate the study of the genital canal there remain for description the vagina and its appendage, the vulva.

The *vagina* is a canal of cylindrical form, inserted by its superior extremity on the cervix, forming the culs-de-sac, and continues at its inferior extremity with the vulva at the level of the hymen. Its length is ten centimetres, measured to the posterior cul-de-sac. Its external surface is in relation to the surrounding viscera, the rectum behind, the bladder in front; and inferiorly, muscular relations with the pelvic floor. Thus the vagina forms a large and spacious cavity in the vicinity of the uterus and becomes narrowed at the vulva.

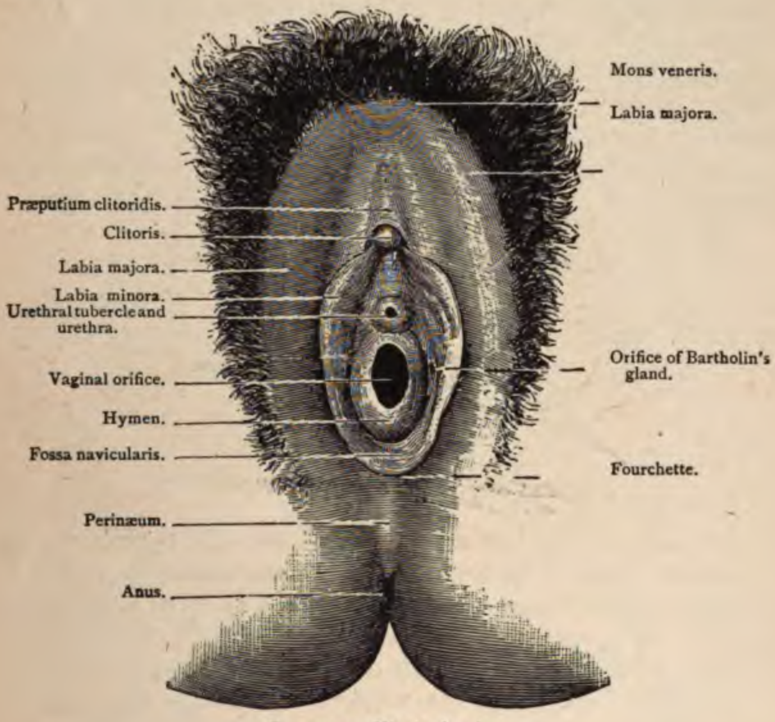


FIG. 102.—Virginal vulva.

In exploring the internal surface of the vagina, by separating the two walls, it is found to have a rosy tint, in the normal state; a violaceous during pregnancy. On both the anterior and posterior walls exists a longitudinal projection called the vaginal column (anterior and posterior).

The vagina is composed of three coats: an external, composed of connective tissue and elastic fibres; a middle, of non-striated muscular tissue, of which the eccentric fibres are longitudinal, and the concentric circular, an internal, mucous, totally deprived of glands but rich in papillæ that are covered by stratified pavement epithelium.

The vulva is composed of three successive and concentric planes:

First plane.—*Mons veneris, labia majora, perinæum.*—The labia majora form two vertical folds, blending above with the mons veneris, and becoming effaced below on the perinæum. In the center of the oval thus formed are found the other vulvar parts. The external surface of the labia is cutaneous and covered with hair; the internal surface is smooth, normally moist and the two labia are often in contact. This contact is destroyed by the separation of the thighs.

Second plane.—*Præputium clitoridis, nymphæ, fourchette.*—The nymphæ are two folds analogous with and parallel to the labia majora, but much more thin. Above they separate to enclose the clitoris. Of the two folds formed by this separation, one forms the prepuce of the clitoris, the other forms the frænum. Below, the nymphæ diminish, and are united by a small fold called the fourchette.

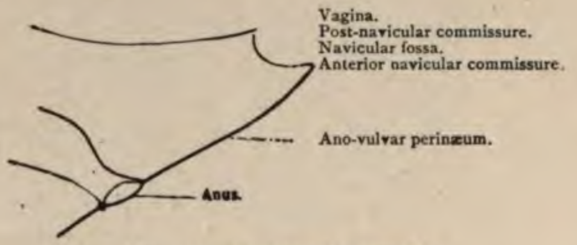


Fig. 103.—Perineo-vulvar profile.

Third plane.—*Vestibule, meatus urinarius and its tubercle, vagina and hymen.*—In the space circumscribed by the base of the nymphæ is found an elliptical surface that can be considered as divided into two equal parts by a transverse line. Above this line is the vestibule, below it is the vaginal orifice. The vestibule presents the urethral tubercle with the meatus urinarius. The vaginal orifice, below this, is more or less protected by the hymen, or the carunculæ which represent its remains. The fossa navicularis is a small depression situated between the fourchette and the hymen or its debris. Laterally the fossa navicularis is lost on the sides of the vulva; anteriorly and posteriorly it is limited by the anterior and posterior navicular commissures (Fig. 103). The vulva is separated from the vagina by the hymen. The intact hymen may present various conformations (Figs. 104 to 111). At the first coitus the hymen is usually ruptured, leaving the hymeneal carunculæ (Fig. 112). After accouchement, these ruptures become deep and by isolated cicatrization form the carunculæ myrtiformes (Fig. 113). In rare cases the hymen may remain intact after coitus, and even after parturition. In exceptional cases, pregnancy has been noted with an imperforate hymen.

Resume of the parturient canal.—Planes and axes.—The parturient canal, consisting, as has been seen, of an osseous passage and of a soft passage, is somewhat modified in its osseous portion by the presence of soft parts which retract the different diameters of the pelvis, but which, nevertheless, do not alter the general form.

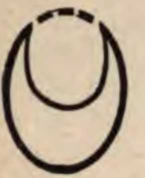


FIG. 104.—Crescent hymen.

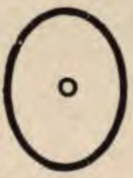


FIG. 105.—Hymen with a small diaphragm.

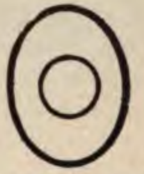


FIG. 106.—Hymen with a large diaphragm.

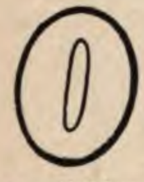


FIG. 107.—Cleft hymen.

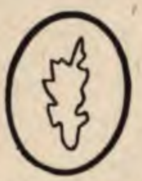


FIG. 108.—Fringed hymen.

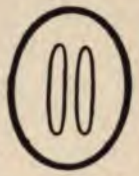


FIG. 109.—Hymen with double slit.

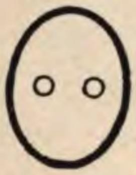


FIG. 110.—Hymen with a double orifice.

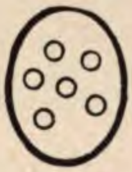


FIG. 111.—Cubiform hymen.

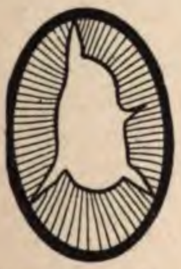


FIG. 112.—Hymeneal carunculæ.

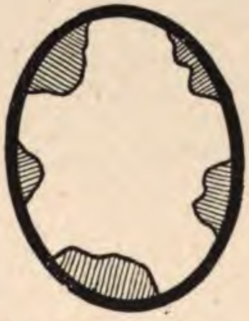


FIG. 113.—Carunculæ myrtiformes.

The plane of the superior strait, with the woman in the erect position, forms an angle of sixty degrees with the horizontal. The plane of the inferior strait is more closely approached to the horizontal, but without coinciding with it. This difference of inclination is due to the unequal hight of the pelvic walls, which, in front (pubis) measure five centimeters, and behind (sacrum) ten cent metres.

The axis of the superior strait, that is the perpendicular to the center of its plane, passes from the umbilicus toward the middle of the coccyx. That of the median strait extends from a point situated a little in advance of the promontory toward the anus. The direction of the axis of the pseudo inferior strait is quite variable on account of the mobility of the coccyx. The direction of these axes is very important in practice, for they indicate the direction in which the tractions on the fœtus should be made.

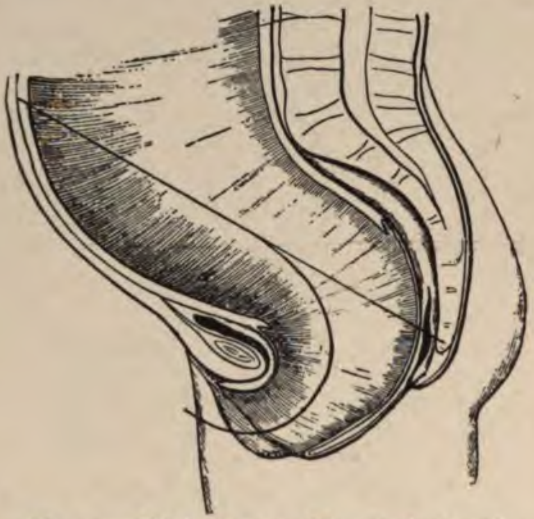


FIG. 114.—Fish-hook curve of the parturient canal.

The general axis of the parturient canal, from the superior strait to the vulva, is not an arc of a circle, as described by Carus, nor an angle, as maintained by Fabbri, but rather a fish-hook, as Tarnier has indicated, that is, rectilinear in the osseous portion and curved in the arc of a circle in the soft parts (Fig. 114). This curve is of the greatest interest to the obstetrician, as will be seen later.

CHAPTER V.

PRESENTATIONS AND POSITIONS.

Presentations.—The fœtus, enclosed in the uterine cavity, is separated from the exterior by the parturient canal, which it must traverse at the moment of labor. For this exit, it may be placed in different ways, *presenting* to the genital opening so many different regions of the body. The symptoms furnished by fœtal exploration and the mechanism of delivery, will necessarily vary according to these different cases. The necessity of a classification of the fœtal presentations is thus imposed on obstetricians. Rolled up in the uterine cavity, the child is generally flexed. This general flexion is accomplished by a series of partial flexions. Thus, the head is flexed on the trunk, the forearms on the arms, the hands on the forearms, the thighs on the trunk, the legs on the thighs, the feet on the legs—*flexion everywhere*. In this attitude, which singularly favors the reduction of the fœtal mass, the child offers the form of an ovoid, the large extremity corresponding to the breech and the small extremity to the head. This is the *somatic ovoid*. The somatic ovoid (Fig. 115) is divided, as explained before, into the cephalic ovoid and the cormic ovoid.

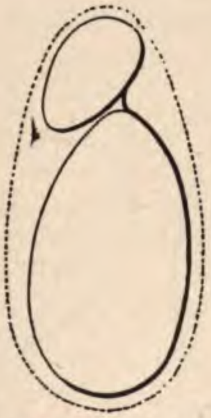


FIG. 115.—Somatic ovoid formed by the union of the two ovoids, cephalic and cormic.

The cephalic ovoid, though smaller than the cormic ovoid, is less reducible. Its great axis extends from the chin to the sagittal suture, a little in advance of the lambda. Considered in its transverse dimensions, it presents a series of points serving as marks of other diameters; these are the biparietal, bifrontal, bimalar and biasteric.

The cormic ovoid, more or less deformed by the addition of the superior and the inferior members, presents its great diameter from the breech to the summit of the thorax. It also offers transverse diameters, such as the bisacromial and bitrochanteric. These two ovoids are united by the neck.

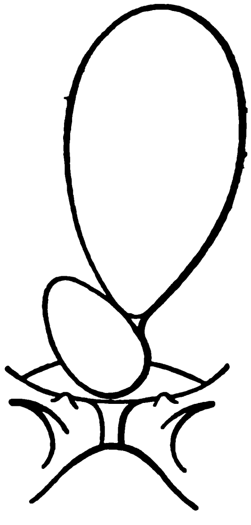


Fig. 116.—Vertex presentation.

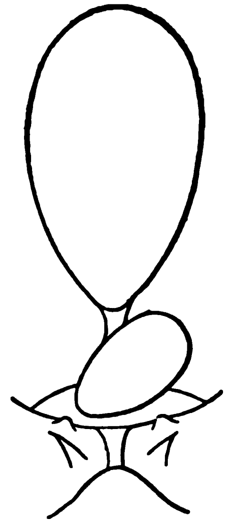


Fig. 117.—Face presentation

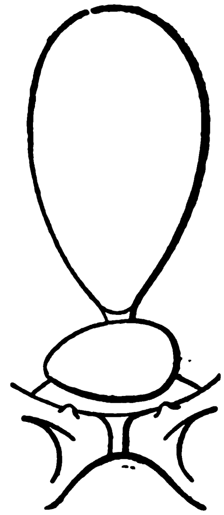


Fig. 118.—Brow presentation.

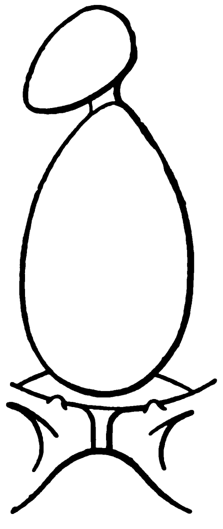


Fig. 119.—Breech presentation.

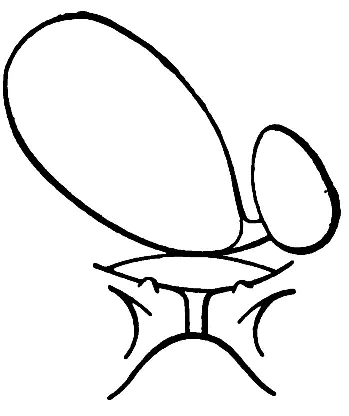


Fig. 120.—Thorax presentation.

The fœtus presents at the genital canal, usually by the cephalic ovoid, sometimes by the cormic ovoid. But every ovum, to pass through the parturient canal, may open it by the large or by the small extremity, or, again, transversely. Theoretically, there are, then, three presentations for every ovoid: large end, small end, and transversely. The same is true with regard to each of the fœtal ovoids.

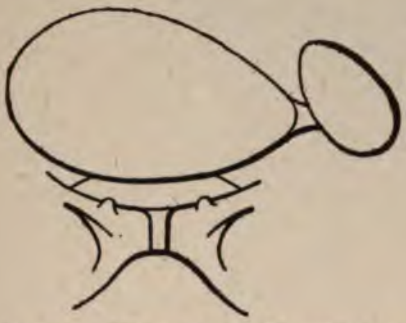


FIG. 121.—Abdomen (lumbar) presentation.

The cephalic ovoid may, in fact, present:

1. Sometimes by its large extremity (vertex) (Fig. 116).
2. Sometimes by its small extremity (face) (Fig. 117).
3. Sometimes transversely (brow) (Fig. 118).

The cormic ovoid also may present:

1. Sometimes by its large extremity (breech) (Fig. 119).
2. Sometimes by its small extremity (thorax or shoulder) (Fig. 120).
3. Sometimes transversely (loins or abdomen) (Fig. 121).

We have then six presentations:

CEPHALIC OVOID.	CORMIC OVOID.
1. Vertex.	1. Breech.
2. Face.	2. Thorax (shoulder).
3. Brow.	3. Abdomen (loins).

The vertex and the breech are identical; they represent the large extremity: one the cephalic ovoid; the other the cormic ovoid. The face and the thorax are analogous, they represent the two small extremities. The analogy is the same for the brow and the lumbo-abdominal region; the ovoids are placed transversely.

Of the six presentations, each comprise one of the zones of the two fœtal ovoids limited by the following planes: For the cephalic ovoid, two planes perpendicular to the long axis of the head, passing, one through the root of the nose, the other through the posterior angle of the bregma. For the cormic ovoid, two planes, also perpendicular to the long axis, and passing, one through the summit of the iliac crests, the other through the point of the zyphoid appendix (Fig. 122).

Relative frequency of these different presentations:

Vertex, -	19 out of	20 parturitions.		
Face, - -	1	" 250	"	
Brow, - -	1	" 300	"	
Breech, -	1	" 30	"	
Thorax, -	1	" 125	"	
Abdomen,	1	" 1000	"	(Relatively too high)

The following proportions may also be adopted. Out of one thousand parturitions there exist:

Vertex, -	956	deliveries.
Face, - -	4	"
Brow, - -	3	"
Breech -	30	"
Thorax, -	6	"
Abdomen,	1	"

(I recall again that 1 to 1000 for the abdomen is relatively too high.)

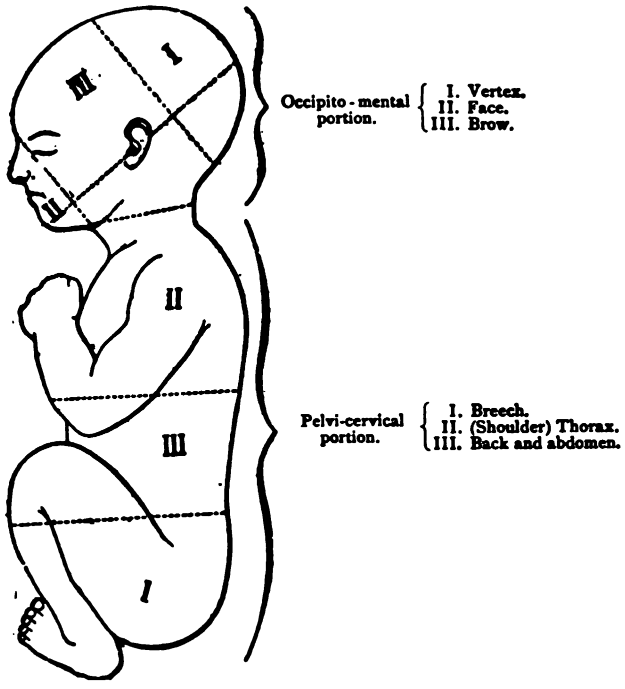


FIG. 122.—Schema of presentable zones.

Each of these six presentations has four varieties. These varieties are of secondary importance to the cephalic ovoid, and only indicate a simple inclination of the fœtal part which presents. A simple enumeration will be sufficient:

I. *Vertex.*—Variety,
- Occipital (exaggerated flexion).
- Frontal (flexion little marked).
- Right parietal (right parietal quite accessible).
- Left parietal (left parietal quite accessible).

II. *Face.*—Variety,
- Mental (extension).
- Frontal (extension not marked).
- Right malar (right malar quite accessible).
- Left malar (left malar quite accessible).

III. *Brow.*—Variety,
- Parietal (tendency to flexion).
- Facial (tendency to extension).
- Right temporal (right temporal quite accessible).
- Left temporal (left temporal quite accesible).

For the cormic ovoid, on the contrary, these varieties are important, for they lead to practical consequences that will be studied later.

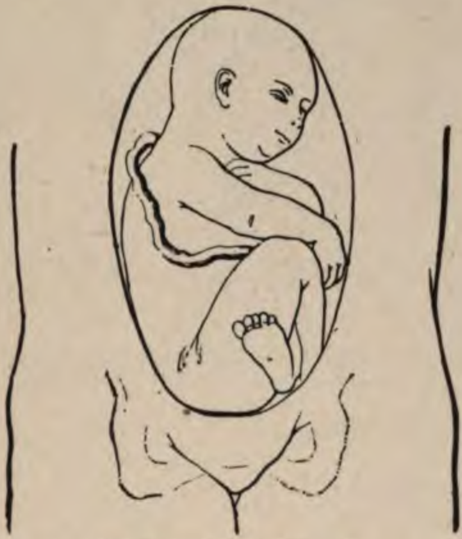


FIG. 123.—Complete breech.

I. *Breech.*—

1. *Complete variety.*—The inferior limbs are flexed and close to the pelvis. This is the type for presentation of the breech (Fig. 123).
2. *Incomplete variety.*—*Thighs.*—The pelvic members are raised up along the anterior plane of the fœtus (Fig. 124).
3. *Incomplete variety.*—*Knees.*—The thighs are extended, but the legs flexed on the thighs, so that the knees constitute the lowest fœtal part (Fig. 125).
4. *Incomplete variety.*—*Feet.*—The inferior limbs are extended, and the feet descend first (Fig. 126).

II. *Thorax.*—

1. Variety of the right shoulder (that is, the region of the right shoulder presents.)
2. Left shoulder.
3. Back (thoracic portion).
4. Sternum.

Thus one of the four surfaces of the thorax presents (anterior, posterior, right or left lateral).

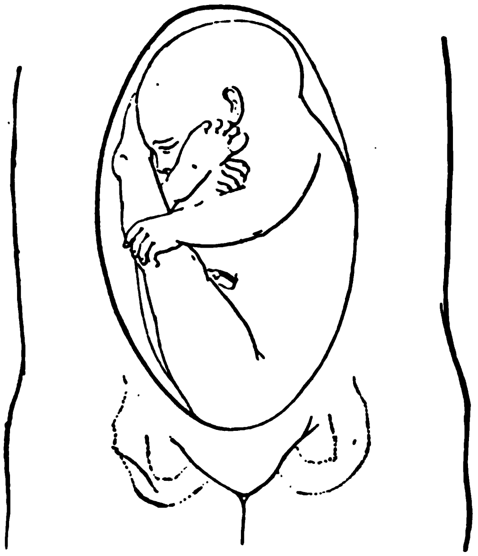


FIG. 124.—Incomplete breech, thigh variety.

III. *Abdomen.*—
1. Variety of the right flank.
2. Left flank.
3. Lumbar regions.
4. Umbilicus.

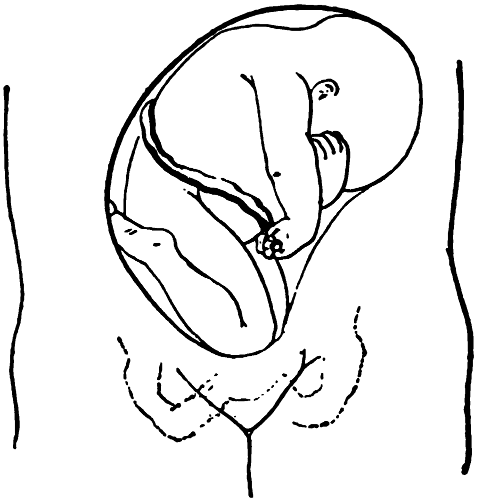


FIG. 125.—Incomplete breech, knee varrety.

Thus, as for the thorax, the variety is constituted by the region of the abdomen (anterior, posterior, right or left lateral) presenting.

I present the following table, placing the figures relative to each presentation and their varieties, which indicate the frequency.

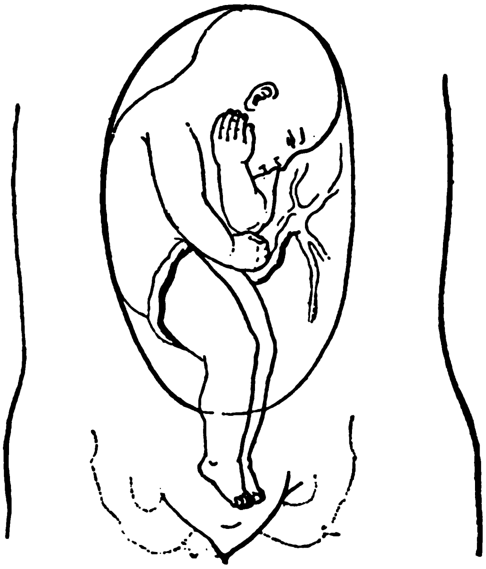


FIG. 126.—Incomplete breech, foot variety.

I. Vertex, 956 per 1000.

Variety,	Occipital,	(?)
	Frontal,	(?)
	Right Parietal,	(?)
	Left parietal,	(?)

II. Face, 4 per 1000.

Variety,	Mental,	(?)
	Frontal,	(?)
	Right malar,	(?)
	Left malar,	(?)

III. Brow, 4 per 1000.

Variety,	Parietal,	(?)
	Facial,	(?)
	Right temporal,	(?)
	Left temporal,	(?)

IV. Breech, 30 per 1,000.

Variety,	Complete,	450 per 1000
	Incomplete, thighs,	300 " "
	Incomplete, knees,	5 " "
	Incomplete, feet,	245 " "

V. Thorax, 6 per 1000.

Variety,	Right shoulder,	500 per 1000
	Left shoulder,	495 " "
	Back,	3 " "
	Sternum,	2 " "

VI. Abdomen, 1 per 1000.

Variety,	Right flank,	(?)
	Left flank,	(?)
	Lumbar regions,	(?)
	Umbilicus,	(?)

Causes of the presentations.—Accommodation, or adaptation of the contained fœtus to the containing uterus, regulates the situation of the child during pregnancy. The laws of this accommodation are two in number and may be formulated thus:

First law (uterine law).—Every contractile containing body adapts to its own form and dimensions its contents even inert, provided it is sufficiently resisting (that is, accommodation can be made with a fœtus recently dead).

Second law (fœtal law).—Every living contents, endowed with active movements, adapts its forms and dimensions to those of a containing body even inert, provided it is sufficiently resisting.

Now, these two essential conditions of accommodation will be reunited: with a firm and contractile uterus; with a vigorous and moving fœtus. The general form of the fœtus is, as we have seen, that of an ovoid, with the large extremity corresponding to the breech, the small extremity to the head. The general form of the uterus is that of an ovoid, with the large extremity corresponding to the fundus, the small extremity to the inferior segment. Accommodation brings the breech of the fœtus to the fundus of the uterus and the head in the inferior segment.

We now know why the fœtus normally presents by the vertex. Let us review the various causes which modify this physiological state and cause other presentations. We shall need to examine successively the pelvis, the uterus, the ovuline appendages and the accidental causes, such as traumatism.

1. *Pelvis.*—In the normal state, with a presentation of the vertex, the head during the latter part of pregnancy engages in the pelvic excavation. This engagement, by fixing the fœtal part, assures the preservation of the presentation. But when any cause (contraction of the pelvis, pelvic tumor) renders difficult or impossible the passage of the superior strait, the head remains mobile and the fœtus, not being fixed, is exposed to mutations of presentation.

2. *Uterus.*—Normal accommodation in presentation of the vertex supposes a uterus sufficiently resisting and of an ovoid form with the small extremity inferior. Any exaggerated flexibility of the uterus, or any alteration of its normal form, becomes a cause of vicious presentations.

By this mechanism act:

Excessive multiparity; by causing a relaxation of the uterine wall, and of the abdominal wall which sustains it. The fœtus remains mobile to the moment of delivery, and in one of its evolutions may become fixed in a vicious presentation.

Lateral and anterior inclinations of the uterus; these inclinations, whether real or apparent, involve the fœtus in their deviation, so that its axis no longer corresponds with that of the pelvis. The result is seen in vicious presentations.

Bifidity of the fundus of the uterus, the vestige of a double uterus, causes, when it is marked, presentation of the thorax or abdomen. Less pronounced bifidity produces either a breech presentation or one of the three presentations of the cephalic ovoid, on account of the direction of the pressure on the vertebral column. I shall explain: The head being articulated with the vertebral column so that the point of the occiput and the chin are at an equal distance from the vertebral foramen, when the pressure transmitted by the vertebral column to the head is made in the direction of the occiput, the cephalic extremity is flexed (vertex presentation); it is extended, on the contrary, when this pressure is directed toward the chin (face presentation), and, finally, it remains intermediate between flexion and extension when the pressure is directed toward an intermediate point, the forehead (brow presentation) (Figs. 127, 128, 129).

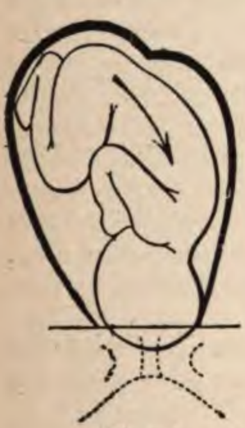


Fig. 127.

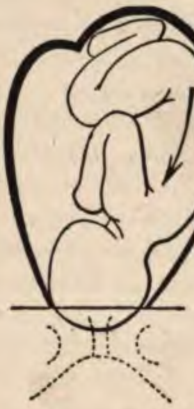


Fig. 128.

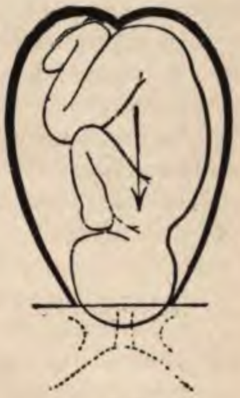


Fig. 129.

FIG. 127.—Genesis of the vertex presentation. Fœtus in L O I T. Breech fixed in the right cornu. Pressure of the vertebral column transmitted toward the occiput.

FIG 128.—Genesis of the face presentation. Fœtus in L O I T. Breech fixed in the left cornu. Pressure of the vertebral column transmitted toward the chin.

FIG. 129.—Genesis of the brow presentation. Fœtus in L O I T. Breech fixed on the median line of the abdomen. Pressure of the vertebral column transmitted toward the brow.

A reverse development of the uterus, that is, of the inferior segment greater than that of the fundus, giving the form of an ovoid with its large extremity below, causes a breech presentation. Finally, tumors of the uterus or in its vicinity, altering its normal form, may be the source of vicious presentations.

3. *Fœtus.*—Any cause altering the general form of the fœtus, or diminishing its volume or its resistance, is susceptible of producing a vicious presentation. We find in this category of causes: Death of the fœtus when it dates from some previous time and when maceration has taken place—accommodation then fails to act; smallness of the fœtus also renders accommodation useless. Hydrocephalus,

with other points taken on the parturient canal, permits the determination of the exact situation of the child. I shall explain by an example: A fœtus presents by the vertex (I take the occiput as a landmark), the occiput may, according to the situation of the child, be in relation with the pubis, with the sacrum, or with other regions of the pelvic ring, thus we should have an occipito-pubic position (contact of the fœtal occiput and the maternal pubis), an occipito-sacral (contact of the fœtal occiput with the maternal sacrum), etc.

1.—*Fœtal points.*

I. Vertex	Occiput	O.
II. Face	Mentum	M.
III. Brow.	Mentum	M. (*Id.* as for face).
IV. Breech	Sacrum	S.
V. Thorax	Acromium	A.
VI. Abdomen	Acromium	A. (*Id.* as for thorax).

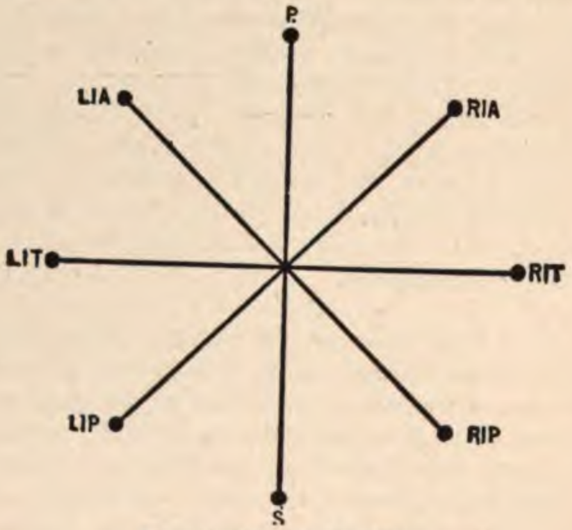


FIG. 130.—Rosette of positions.

2. *Maternal points.*—There have been taken on the contour of the pelvic ring the terminal points of the different diameters. These points are the following:

Point.—	Pubic	P.
	Right anterior iliac	R A I.
	Right transverse iliac	R T I.
	Right posterior iliac	R P I.
	Sacral	S.
	Left posterior iliac	L P I.
	Left transverse iliac	L T I.
	Left anterior iliac	L A I.

As a whole these points, in comparison with a mariner's compass, may be called the compass of the positions.

Now for each position let us put the fœtal point in relation with different maternal points and we shall have the series of positions which follow:

I. *Vertex* (*Occiput*).—*O.*

Position.—Occipito-pubic	O P.
Right anterior occipito-iliac	R O A I 3.*
Right transverse occipito-iliac	R T O I.
Right posterior occipito-iliac	R O P I. 2.
Occipito-sacral	O S.
Left posterior occipito-iliac	L O P I 4.
Left transverse occipito-iliac	L O T I.
Left anterior occipito-iliac	L O A I 1.

II. *Face* (*Mentum*).—*M.*

Position.—Mento-pubic	M P.
Right anterior mento-iliac	R M A.

I. *Vertex* (*Occiput*).—*O.*

Position.—Occipito-pubic	O P.
Right anterior occipito-iliac	R O I A 3.*
Right transverse occipito-iliac	R O I T.
Right posterior occipito-iliac	R O I P 2.
Occipito-sacral	O S.
Left posterior occipito-iliac	L O I P 4.
Left tranverse occipito-iliac	L O I T.
Left anterior occipito-iliac	L O I A 1.

II. *Face* (*Mentum*).—*M.*

Position.—Mento-pubic	M P.
Right anterior mento-iliac	R M I A.
Right transverse mento-iliac	R M I T.
Right posterior mento-iliac	R M I P.
Mento-sacral	M S.
Left posterior mento-iliac	L M I P.
Left transverse mento-iliac	L M I T.
Left anterior mento-iliac	L M I A.

III. *Brow* (*Mentum*).—*M.*
Id. as for the face.

IV. *Breech* (*Sacrum*).—*S.*

Position.—Sacro-pubic	S P.
Right anterior sacro-iliac	R S I A 3.

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*The figure following the oblique positions indicates their relative frequency, the figure 1 representing the most frequent, which has been called the first position of the vertex.

Right transverse sacro-iliac	R S I T.
Right posterior sacro-iliac	R S I P 2.
Sacro-sacral	S S.
Left posterior sacro-iliac	L S I P 4.
Left transverse sacro-iliac	L S I T.
Left anterior sacro-iliac	L S I A 1.

V. *Thorax* (*Acromium*).—*A.*

Position.—	Acromio-pubic	A P.
	Right anterior acromio-iliac	R A I A.*
	Right transverse acromio-iliac	R A I T.
	Right posterior acromio-iliac	R A I P.
	Acromio-sacral	A S.
	Left posterior acromio-iliac	L A I P.
	Left transverse acromio-iliac	L A I T.
	Left anterior acromio-iliac	L A I A.

VI. *Abdomen* (*Acromium*).—*A.*
Id. as for the thorax.

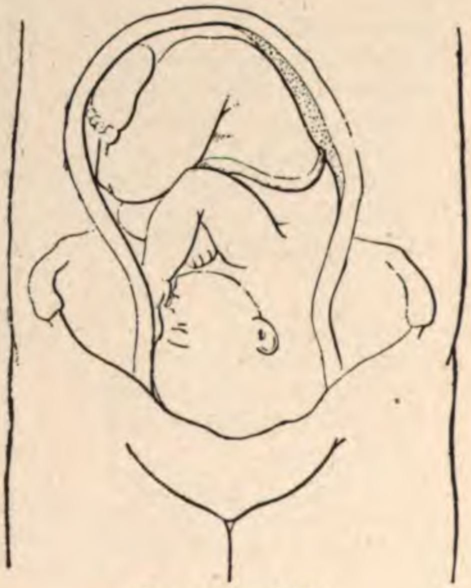

FIG. 131.—L O I T.

To render complete and intelligible this enumeration of the positions in the different presentations, I have adjoined a series of illustrations showing the situation of the fœtus in these different cases (except the brow presentations which take the same situations as for the face, by slightly flexing the head and by assuming a position intermediate between a vertex and a face presentation; and abdominal presentations, which occupy the same situation as for the thorax, by slightly drawing the thorax away from the center of the genital canal, so as to replace it by the abdomen).

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* For the frequency of the positions of the thorax, it is sufficient to know that the dorso-anterior are more frequent than the dorso posterior.

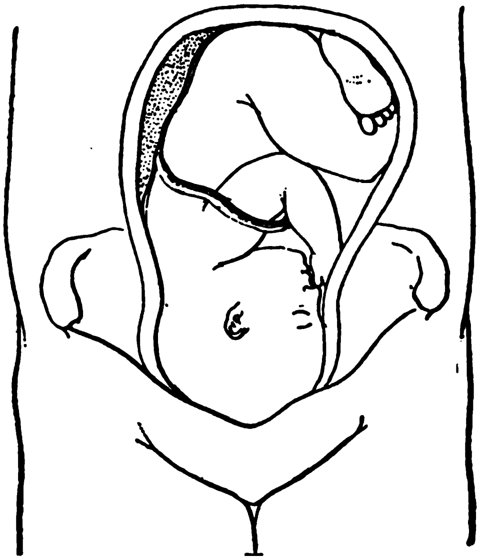


FIG. 132.—R O I T.

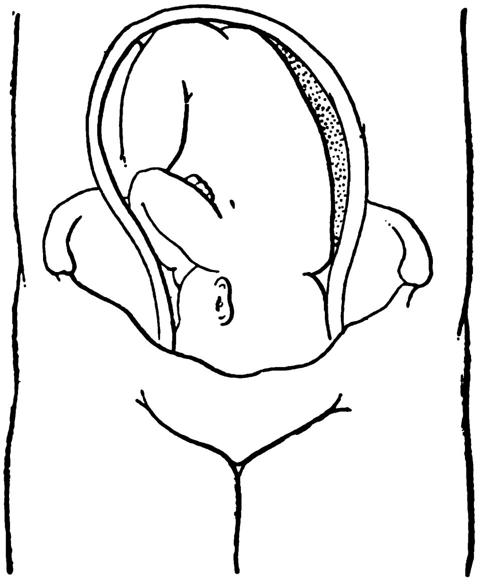


FIG. 133.—L O I A.

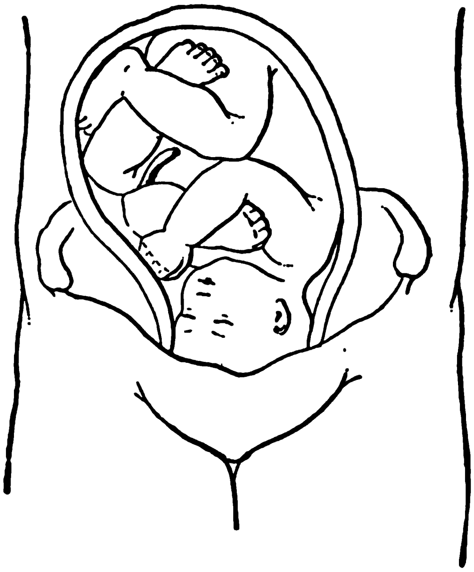


FIG. 134.—L O I P.

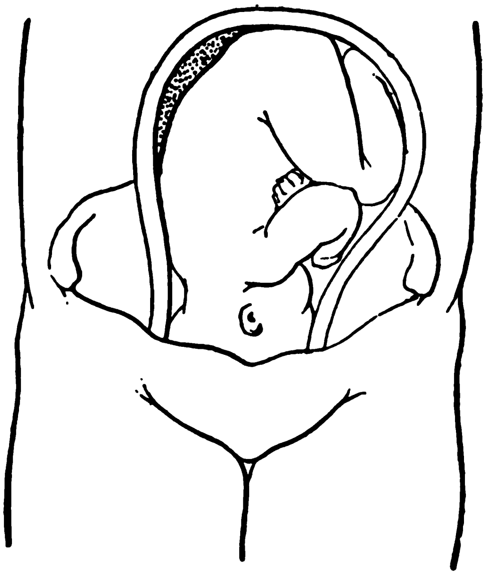


FIG. 135.—R O I A.

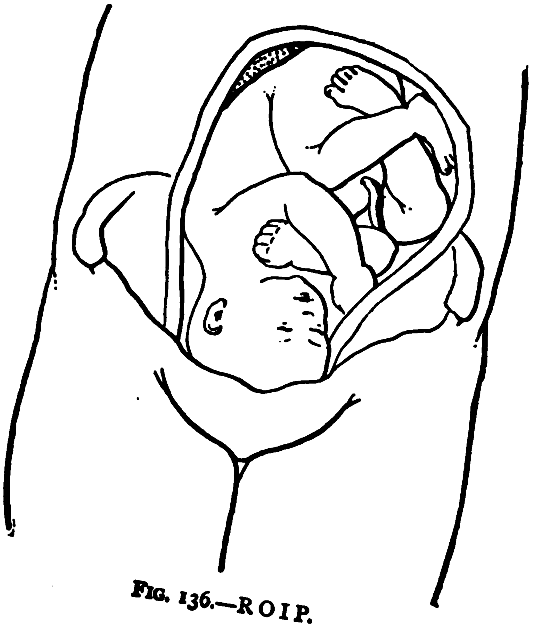


FIG. 136.—R O I P.

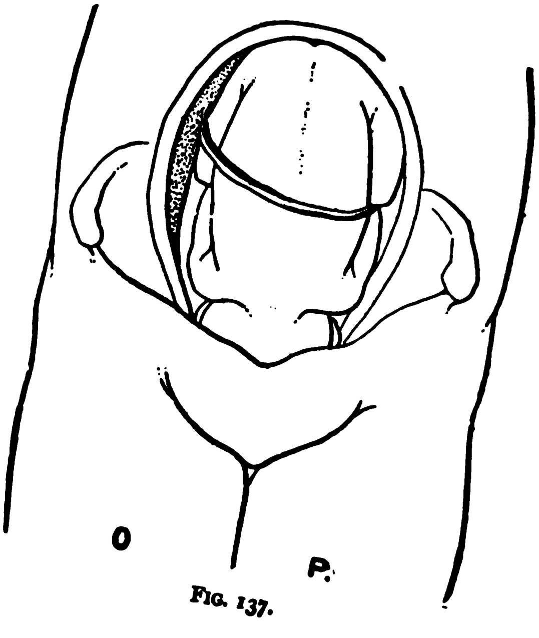


FIG. 137.

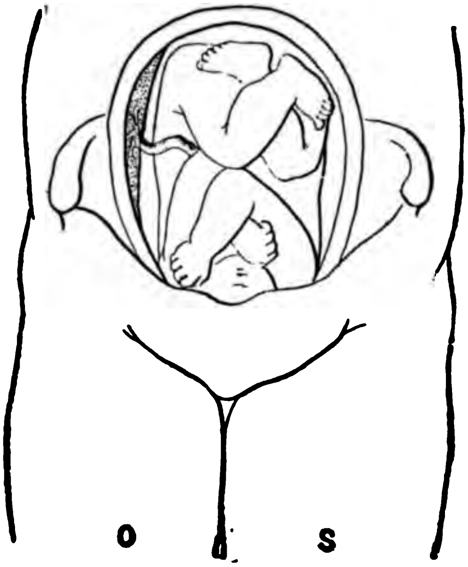


FIG. 138.

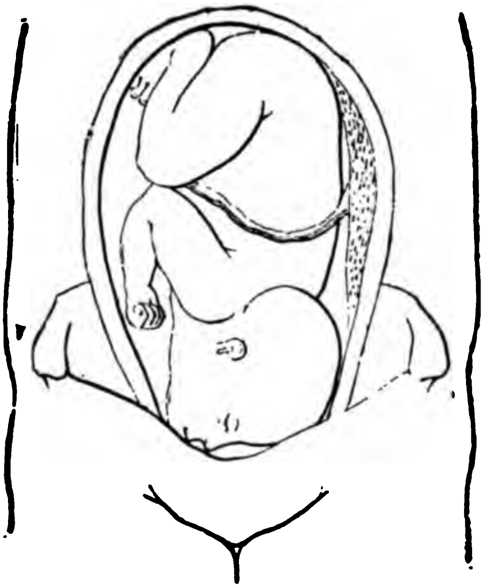


FIG. 139.—R M I T.

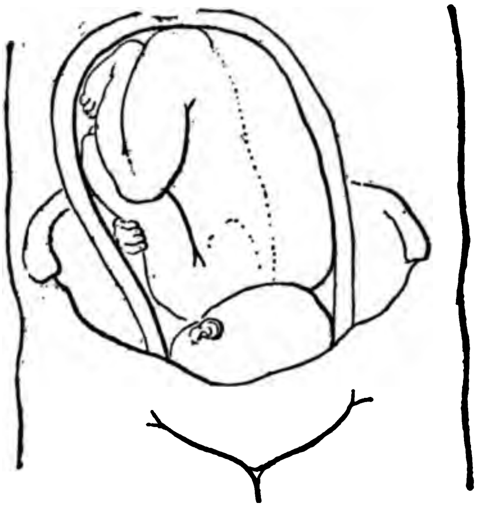


FIG. 144.—R M I P.

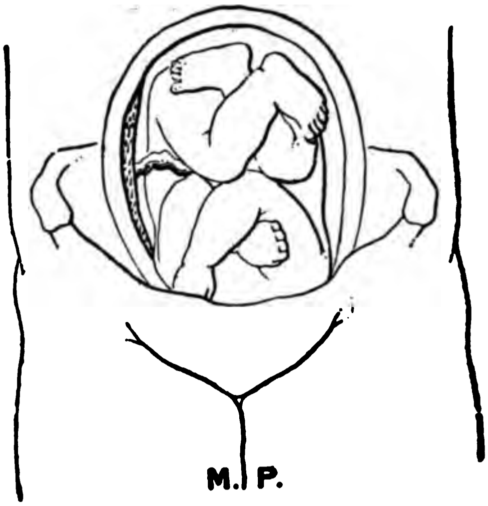


FIG. 145.

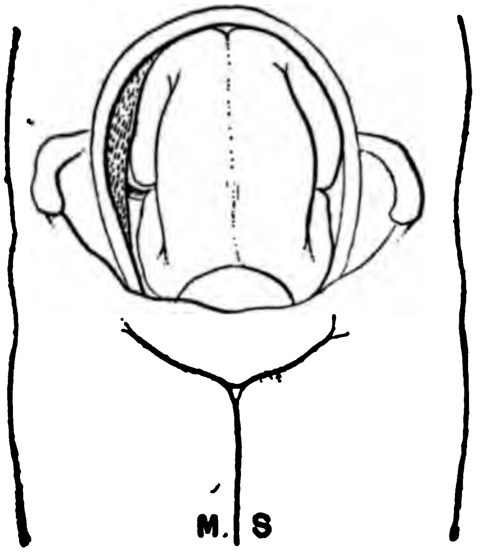


FIG. 146.

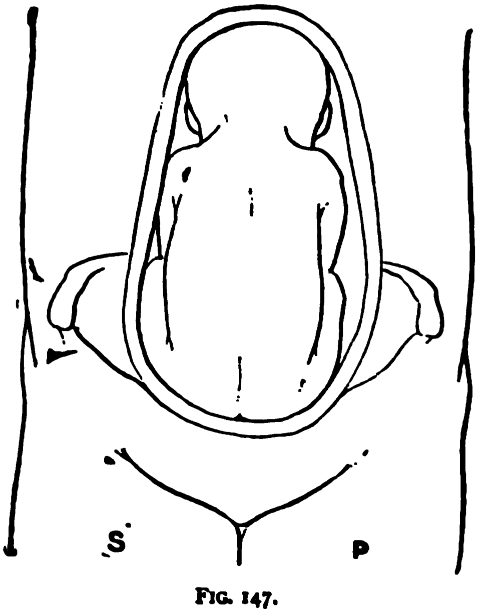


FIG. 147.

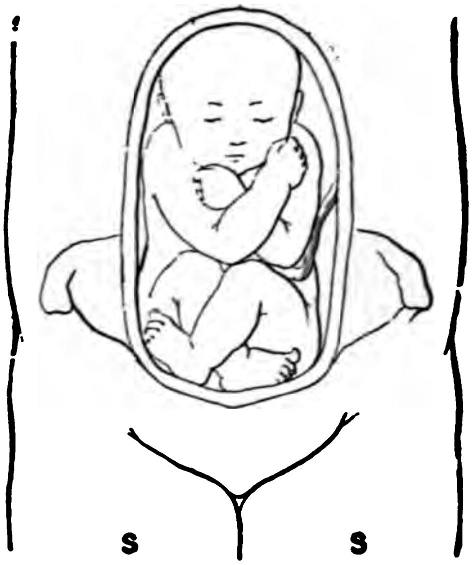


FIG. 148.

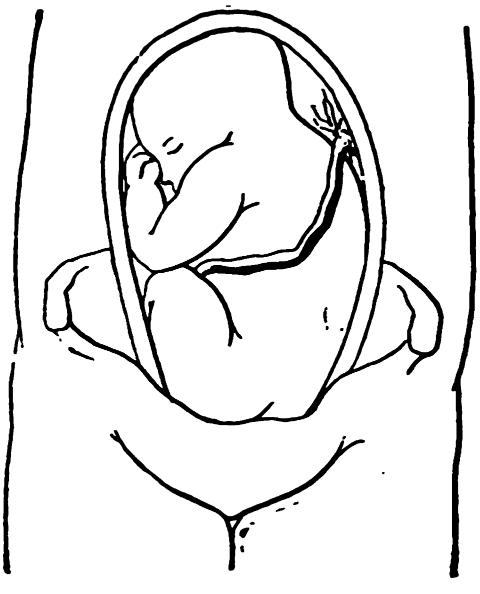


FIG. 149.—L S I A.

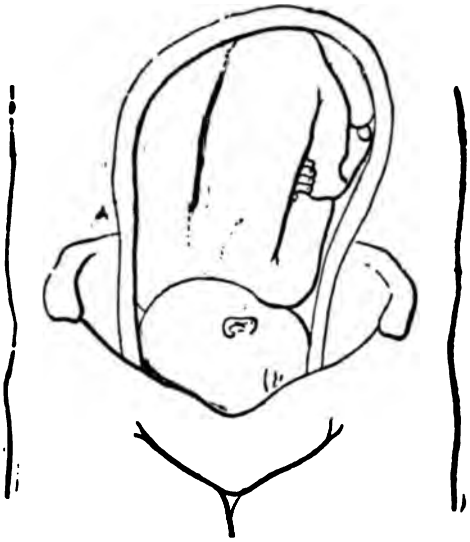


FIG. 142.—L M I P.

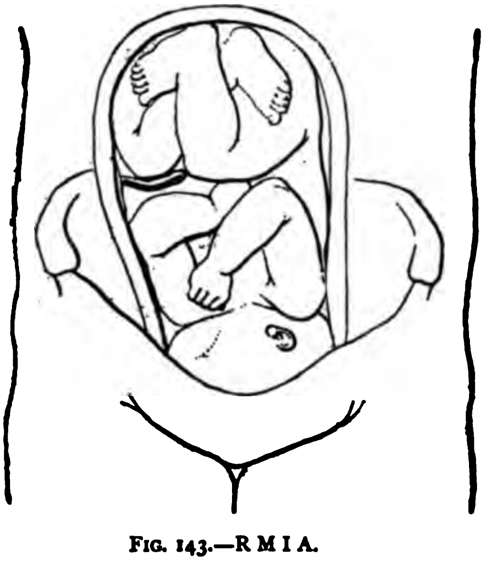


FIG. 143.—R M I A.

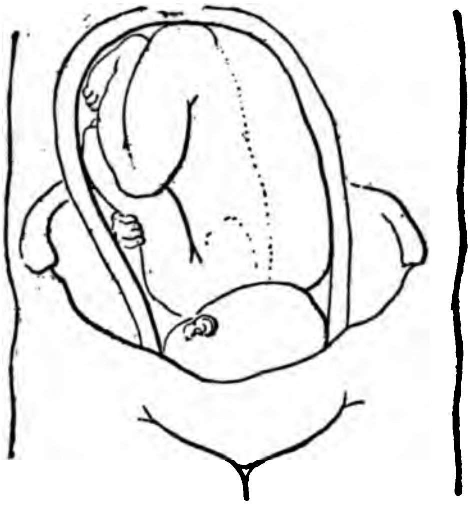


FIG. 144.—R M I P.

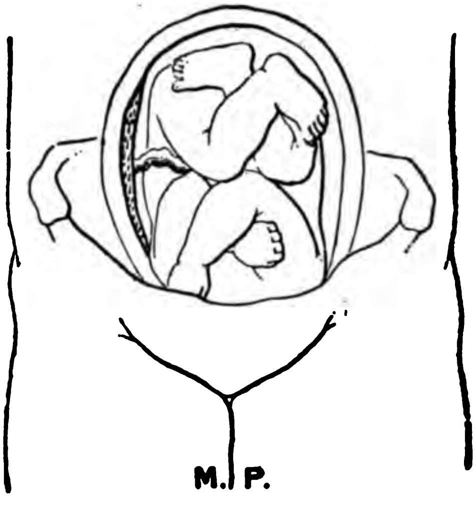


FIG. 145.

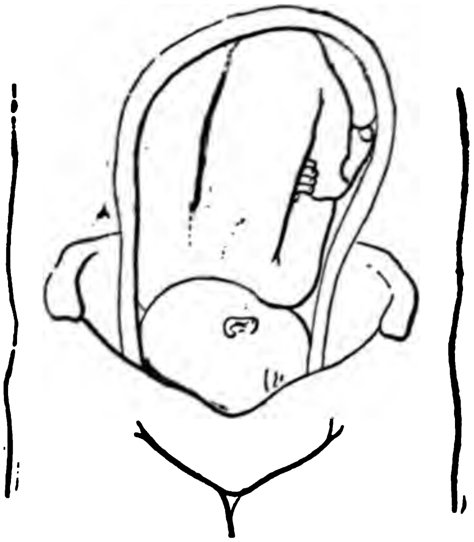


FIG. 142.—L M I P.

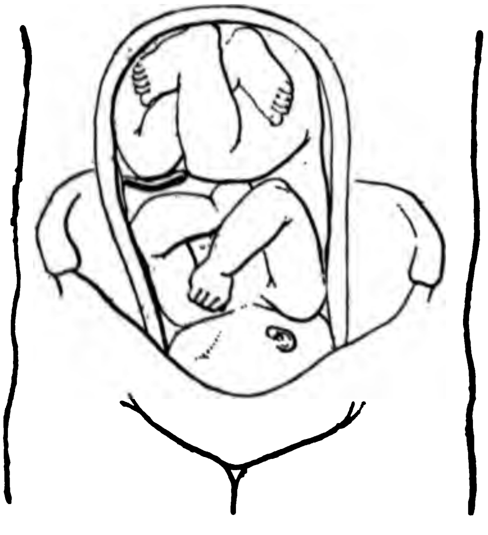


FIG. 143.—R M I A.

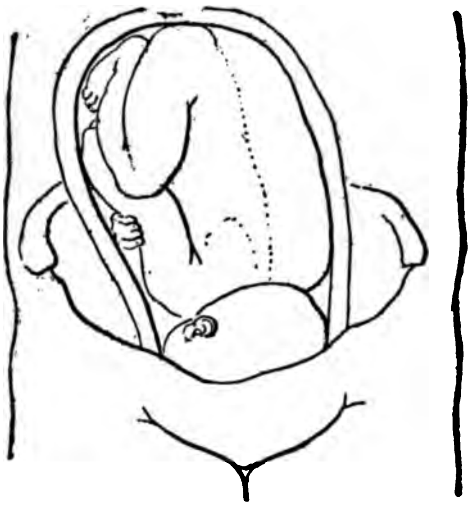


FIG. 144.—R M I P.

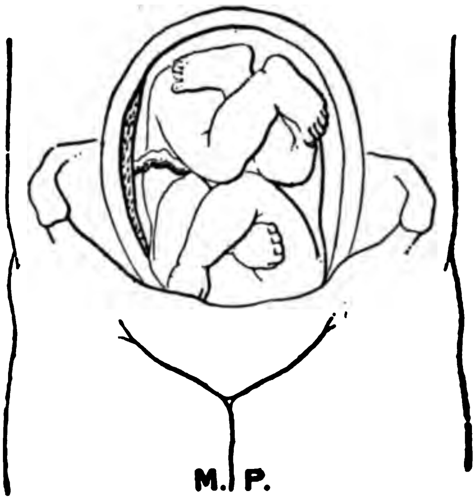


FIG. 145.

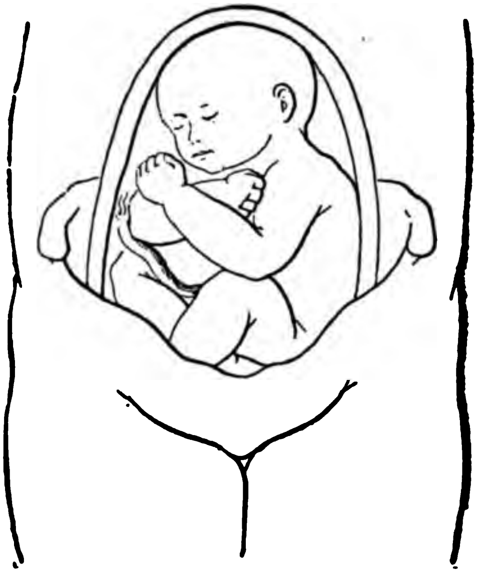


FIG. 150.—L S I P.

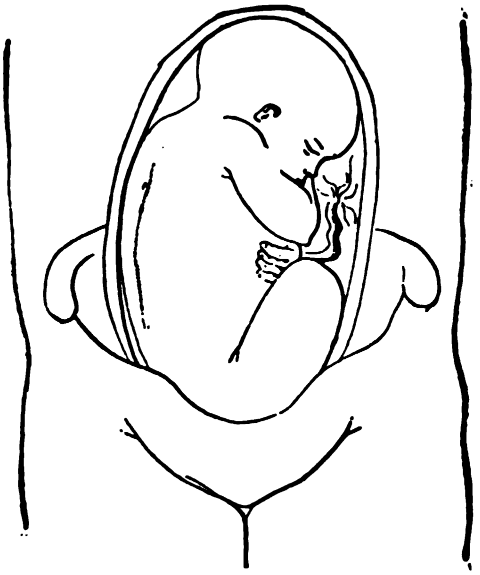


FIG. 151.—R S I A.

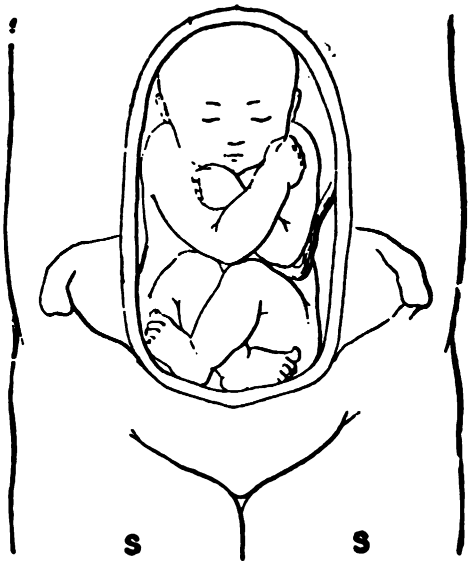


FIG. 148.

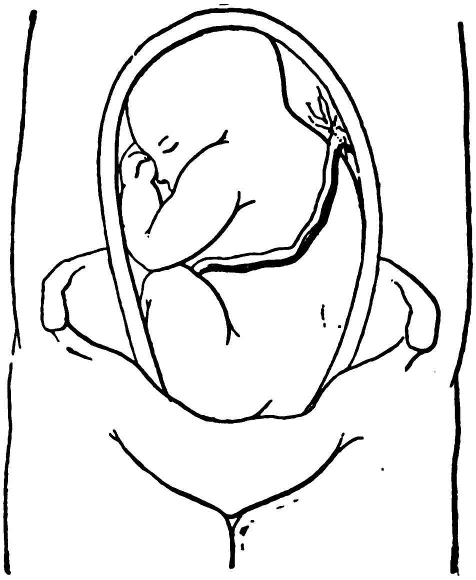


FIG. 149.—L S I A.

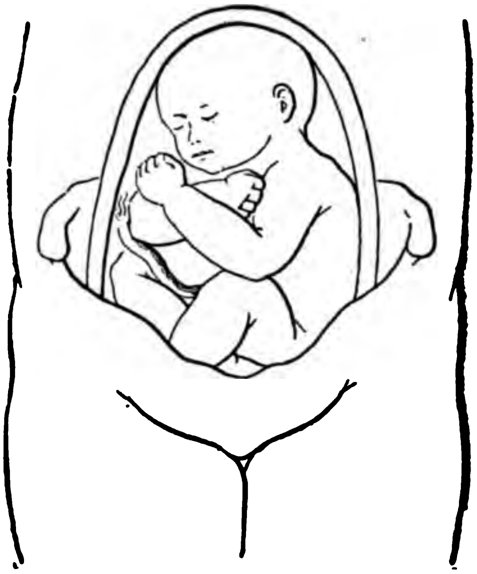


FIG. 150.—L S I P.

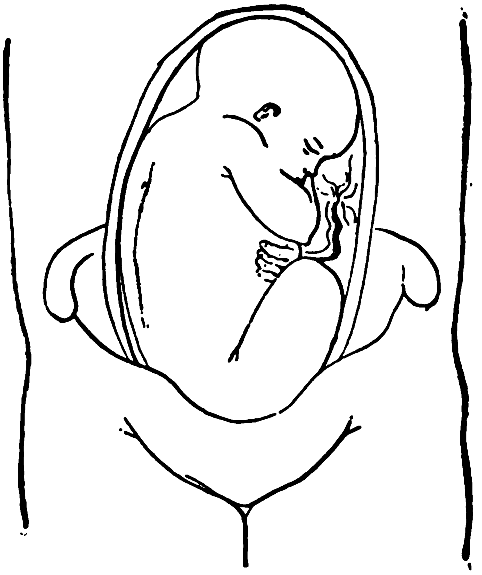


FIG. 151.—R S I A.

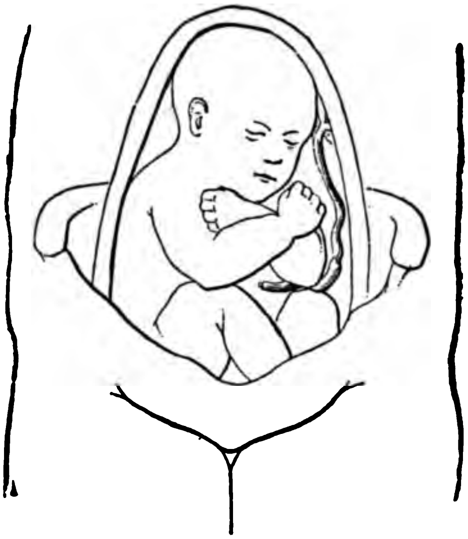


FIG. 152.—R S I P.

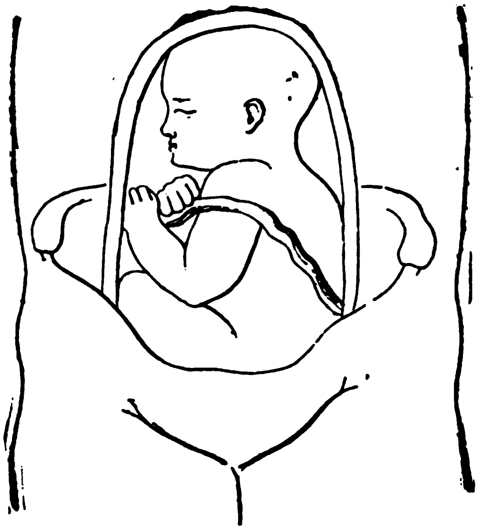


FIG. 153.—L S I T.

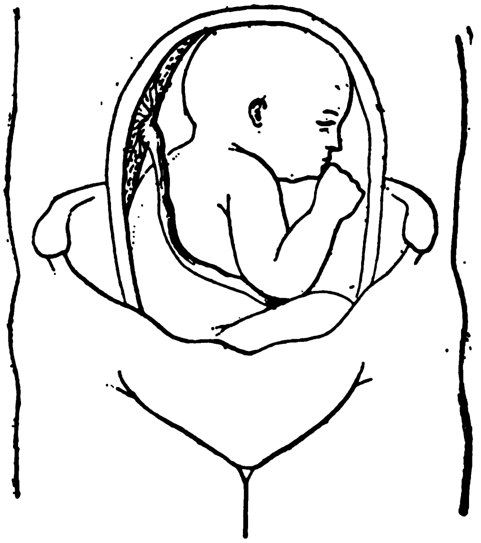


FIG. 154.—R S I T.

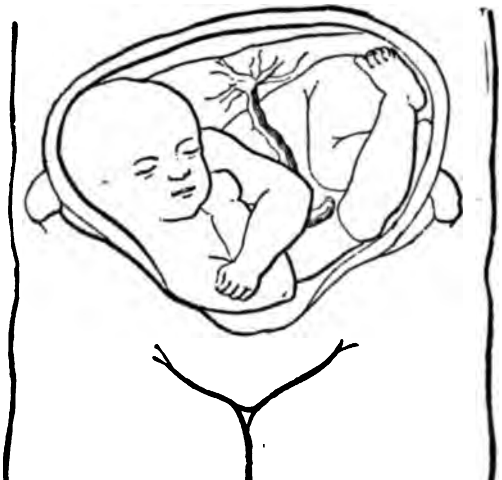


FIG. 155.—R A I T.

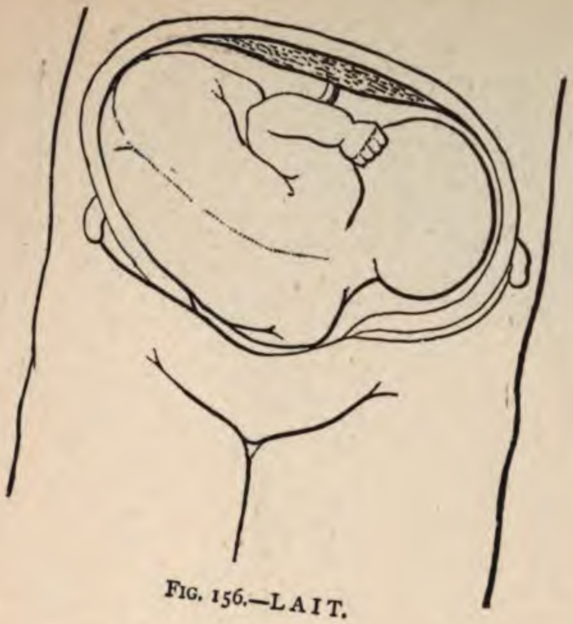


FIG. 156.—L A I T.

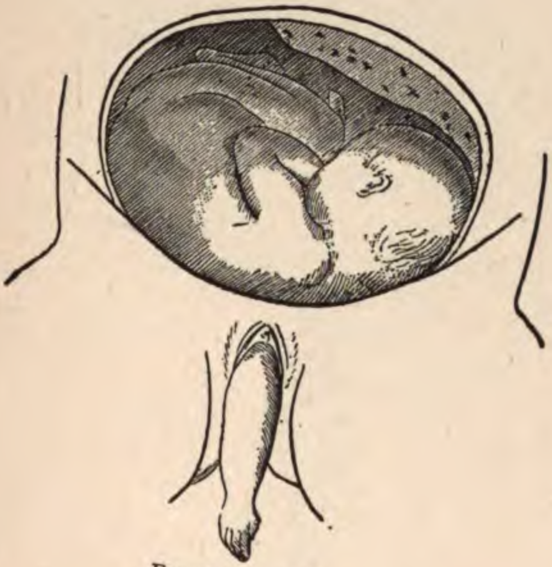


FIG. 157.—L A I A.

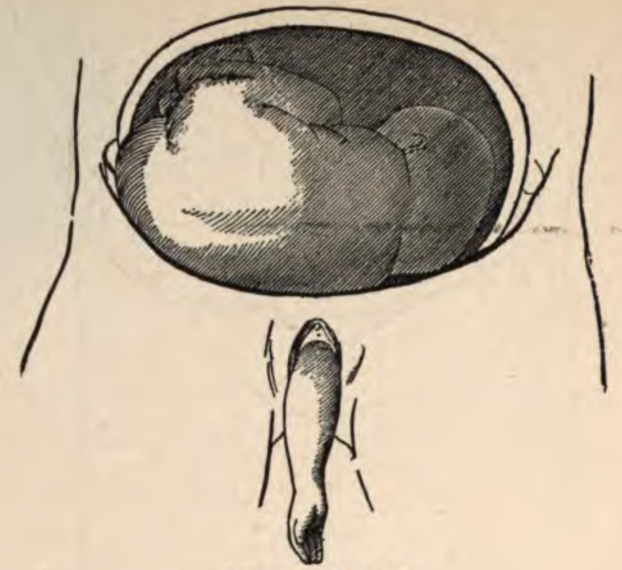


FIG. 158.—L A I P.

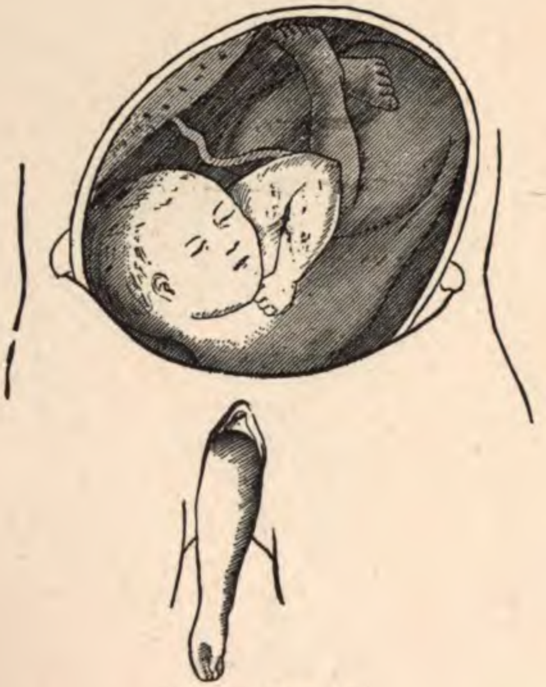


FIG. 159.—R A I A.

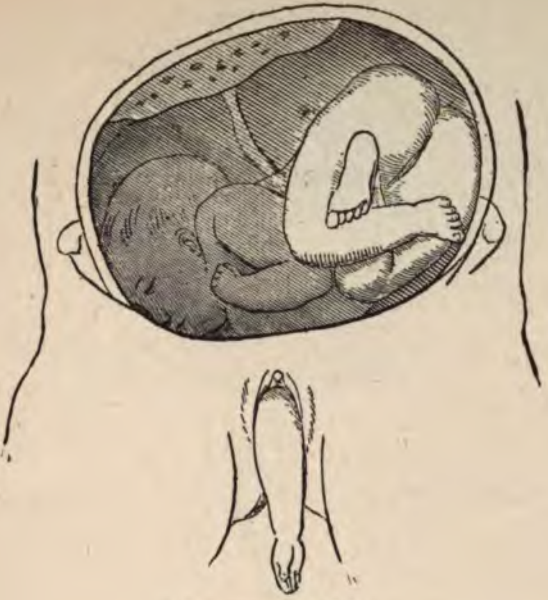


FIG. 160.—R A I P.

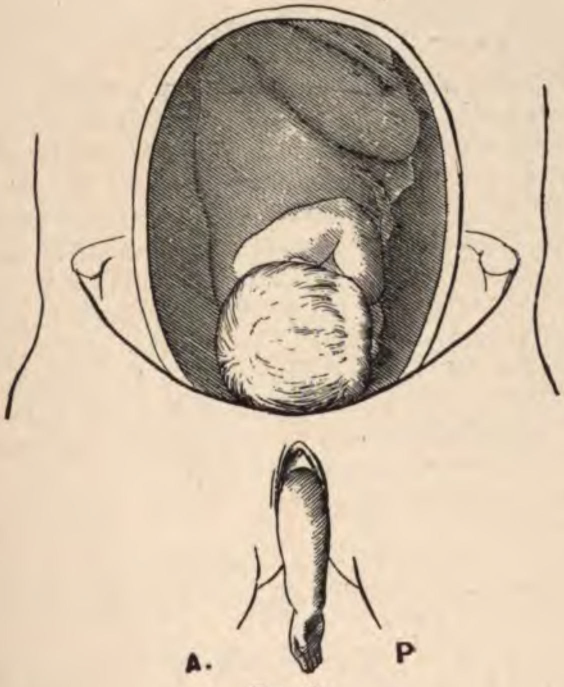


FIG. 161.

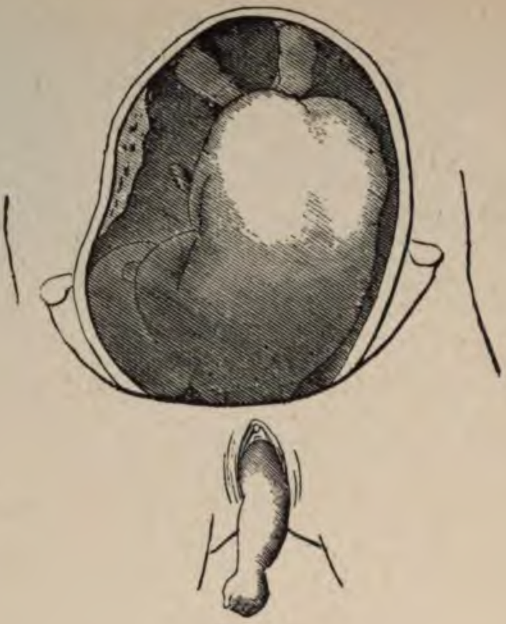


FIG. 162.

Ætiology of the positions.—*Vertex.*—The two most frequent positions are, first, L O I A, then R O I P. It has been asked why the long diameter of the head voluntarily occupies the oblique cæcal diameter, and it has been replied that this diameter is greater than the rectal or that the distention of the rectum diminishes the latter. But this explanation, which is only an hypothesis, is not satisfactory. It is probable that the head is found to occupy the oblique cæcal diameter on account of the more marked development of the right cornu of the uterus. With regard to the predominance of the L O I A in relation to the R O I P, it responds to a law which regulates all the presentations: The back of the fœtus, on account of the projection of the vertebral column posteriorly, is better accommodated to the anterior part of the uterus than to the posterior. I only speak here of the ætiology of the oblique positions, as they are the only ones authors generally treat of. The transverse and the direct positions are governed like the oblique by the form of the pelvis.

Face, Brow.—Presentations of the face being only transformations of those of the vertex, the same ætiological considerations apply to the positions.

Breech.—The breech only rarely engaging during pregnancy the question of the extent of the pelvic diameters is only secondary.

The head lodging in the right cornu, the back will be placed to the left and in front or to the right and behind.

Thorax, Abdomen.—During pregnancy transverse positions are scarcely ever found. According to the general rule the back is usually found to the front, in such a manner that for the left shoulder the RAIT is observed and the LAIT for the right shoulder. The accommodation of the back is the cause.

CHAPTER VI.

SYMPTOMATOLOGY OF PREGNANCY.

The symptoms and signs of pregnancy may be divided into two great classes: those which depend on the genital system, and those which, on the contrary, are independent. We have, then: 1. The extra-genital symptoms. 2. The genital symptoms.

I. *Extra-genital symptoms.* — The modifications of the different systems (nervous, respiratory, circulatory, digestive, etc.) have been previously studied, and, to avoid useless repetitions, I shall not return to them.

II. *Genital symptoms.*—In examining the pregnant woman we proceed successively to:

1. Interrogation.
2. Inspection.
3. Palpation (and to percussion).
4. Auscultation.
5. Digital examination.

I shall conform to this order in the study of the symptoms of pregnancy. The symptoms furnished by interrogation respond very nearly to those designated as rational, and those of the four other categories to the physical signs.

1. **Interrogation.**—The information that the woman can furnish as to the sexual relations, the actual cause of pregnancy. will rarely be of any use. Their absence in cases of doubtful diagnosis, or their isolated existence at a fixed date, when it relates to a precise statement of the epoch of pregnancy, will be the only points to seek, and on these points the confidence in feminine veracity should be limited.

From menstruation, on the contrary, may be deduced signs of great value.

Every arrest of menstruation in a healthy woman, normally regular, should bring to mind the possibility of the existence of pregnancy

Conception may take place at any period of the inter-menstrual period or during the menstrual flow, but in the majority of cases it occurs during the ten days following the end of menstruation. From this moment of conception the menstrual flow does not appear. There are, however, exceptions, and some women continue to menstruate during pregnancy. It has been objected that menstruation during pregnancy is modified in duration, quantity or quality. But, practically, the woman reports a periodical flow of the same abundance and quantity as before pregnancy. There is then nothing to show that this flow of blood differs from normal menstruation. It is just to conclud that this woman is menstruating but it must not be deduced that the uterus is empty. Conclusion: If the cessation of menstruation is one of the best signs of the beginning of pregnancy, we must not base an affirmation of the vacuity of the uterus on its persistence.

The development of the abdomen is only perceived by the woman at the end of a certain stage of pregnancy (two months and sometimes even more). Soon after conception, some women perceive a certain flattening of the abdomen. The development of the abdomen, generally perceived clearly at the end of the fourth month, rarely progresses with regularity. All other things being equal, the development of the abdomen is as much more considerable as the number of pregnancies becomes greater—a fact explained by the increasing laxity of the abdominal walls.

We shall ignore the exact date at which the first movements of the child are perceived, but we know that they are generally felt at the beginning of the fourth month. In general, it is at four months and a half that these movements are perceived, sometimes later. Some pregnant women never feel them.

The descent of the uterus resulting from engagement causes pelvic obstruction (frequent urging to urination, exaggeration of the constipation) and a thoracic relief (easier respiration). At the same time the abdomen seems to diminish in volume. Women usually can give quite exact information on these different symptoms.

2. **Inspection.**—The inspection of the abdomen and of the external genital organs reveals a series of modifications, that have already been discussed and which I only recall here. On the side of the abdominal wall, besides the distention produced by the increase in the size of the uterus, are noted the lineæ albicantes, especially numerous in the subumbilical region, and the brownish

pigmentation along the linea alba. The external genital organs, besides œdema and varices, undergo a hypertrophy which give them a swollen aspect. The vestibule and the vulvo-vaginal orifice have a violaceous coloration that is also found on the vagina and cervix by using a speculum. This coloration sometimes aids the diagnosis of pregnancy, but it is not pathognomonic. Besides this, there is found sometimes in brunettes a diffuse pigmentation of the vulva, especially marked on the labia majora.

3. **Palpation.**—Percussion is a variety of palpation but while it occupies a considerable place in medicine, its part is of slight importance in obstetrics. Percussion can only serve to give information as to the height of the uterus and on the contents of normal or pathological organs situated around or in front of the uterus. I shall not insist on these secondary ideas but pass at once to palpation itself.

For palpation the woman should be disrobed, preserving no garment that will obstruct abdominal palpation. Save in rare exceptions the horizontal decubitus is indispensable, the head a little elevated, the limbs extended and slightly separated from each other, the arms stretched along the body, all the muscles being relaxed as much as possible. The obstetrician should have warm hands, for a cold contact predisposes to muscular contraction. The physician places himself to the right of the patient and proceeds with extreme slowness.

The palpation consists of three portions: (A). *Præuterine,* in which the abdominal wall and the organs around the uterus are explored; (B) The *uterine,* where the walls of the uterus are examined; (C) The *intra-uterine,* in which the contents of the uterus are in question, that is the ovum itself in the case of pregnancy. Let us examine each of these in succession:

A. *Præuterine.*—The thickness of the abdominal wall will be appreciated by pinching it up in front of the uterus. Præuterine palpation affords information as to the presence of intestinal loops in front of the uterus, on the degree of distention of the bladder, when this reservoir exceeds the superior strait. In this præuterine exploration, the fingers will often feel the round ligaments, forming a cord quite clearly perceptible during pregnancy, especially when it is the seat of varices, and sometimes one of the ovaries. In this exploration will be recognized the tumors developing at the expense of the abdominal organs.

B. *Uterine.*—By following the contour of the uterus, its height above the symphysis or above the umbilicus will be determined, an important observation in determining the date of the pregnancy, and its inclination to one side or the other of the abdomen will be recognized. Supple in a normal state, the uterine wall becomes resistant during contraction. In cases of excessive softness of the uterus, this contraction becomes necessary to afford a clear contour of the organ and to reveal the peculiarities of its conformation. By palpation the approximate thickness of the uterine wall can be determined. This is especially to be appreciated by the degree of the distance of the fœtal part. Some uterine walls appear so thin by the superficiality of the fœtus as to give the impression of an extra-uterine pregnancy. Uterine exploration also affords information on the existence of malformations and on the presence of fibroids. The latter, when of small size, may be mistaken for fœtal parts, but their immobility and their preception during uterine contraction will avoid an error of diagnosis.

C. *Intra-uterine.*—We arrive at the exploration of the uterine contents, which constitutes the third and the most important portion of palpation. In palpation of the ovum, many of the sensations imparted by the fœtus are exact, many of those given by the appendages (placenta, cord, amniotic liquid) are vague. In exceptional cases it is possible that a special doughiness may separate the fingers from the fœtal plane, this supposes a placenta at this point. I have never felt such a sensation. When the abdominal wall is very thin the fingers may meet a cord surrounding the fœtal trunk. The liquor amnii in normal quantity gives a fluctuation as a whole analogous to that obtained at the surface of a large abscess. The fœtus, however, is the principal aim of our exploration, and the hands, separated from it by the utero-abdominal wall, should become familiar with it. Before going further in this study, it is important to note two important signs that are to be considered as positive signs of pregnancy. I speak of passive movements and of active movements of the fœtus. The first attest the presence of a fœtus and the second indicate that the child is living. The first is furnished by preference by the fœtal head, the second by the thoracic members and especially by the pelvis.

1. *Passive movements.*—Usually designated as balottement these movements are produced in the following conditions (I suppose the fœtal head at the fundus of the uterus, two or three fingers are applied mediately at its point of contact): *a.* A sudden concussion is given to the fœtal head by depressing the abdominal wall; the fingers receive the sensation of a distant flying body—*single* sensation (of departure). *b.* Often, the hand being left in place, at the end of a few seconds the head returns to its first position and imparts a shock to the fingers—*double* sensation (of departure and of return). *c.* If the two hands are applied to the lateral extremities of the head, the fœtal head pushed suddenly by one hand gives a sensation of departure, comes against the o[illegible] sensation of shock, and then returns to its [illegible]

third shock—*treble* sensation (of departure, of shock, and of return). Such are the varieties of balottement, I add *abdominal*, for we will see later that there exists a vaginal.

Balottement constitutes a positive sign of pregnancy, on one condition, which is that the tumor giving this sensation must be intra-uterine. This condition is, in fact, indispensable, for it sometimes happens that abdominal tumors may float in an ascitic fluid. I have met two cases of abdominal tumors producing ballottement, but these tumors are never intra-uterine. Every intra-uterine tumor which imparts the sensation of ballottement, indicates, then, with certainty, the presence of a fœtus.

2. *Active movements.*—By applying the hands for some time on the abdominal wall there are felt slight shocks produced by the feet of the fœtus uplifting the utero-abdominal wall, more rarely by other fœtal parts. These movements are often perceptible to vision. Besides these slight shocks the hand sometimes perceives a more extended movement, caused by the displacement of the fœtus as a whole. These movements, easily perceptible to the mother, are often a cause of error on her part on account of the possible confusion with other analogous sensations; but it is not the same when they are perceptible to the physician. A shock clearly perceived by the obstetrician at the surface of a tumor of the abdomen, without the interposition of the intestine between this tumor and the abdominal wall, indicates the positive presence of a living fœtus.

Active movements, perceived by the obstetrician, are, then, a positive sign, but on condition of the absence of the intestine, for contractions of this organ may sometimes simulate fœtal movements. Now, percussion easily detects the presence of the intestine by its sonorousness. Muscular contractions of the abdomen can not simulate fœtal movements, for the surface of their production is too large. I add in conclusion that these active movements to constitute a positive sign must be *clearly* perceived. Having studied the active and passive movements of the fœtus, let us pass in review the details of the peculiarities of fœtal palpation.

The head is distinguished by its hardness, its rounded form and its mobility, in the absence of engagement in the pelvis. The last character is absent when the head is fixed in the pelvic ring, but the other characters are sufficient then for its recognition. In case of doubt, the groove constituted by the neck will be a valuable mark to distinguish the head from the breech.

The breech is regular at one side (buttocks), irregular at the other (pelvic members). It appears larger than the head, when it is complete (thighs flexed and close to the body), less in size, on the contrary, when it is incomplete. Exceptionally it furnishes the sensation of ballottement.

The thorax and the abdomen are not more often accessible than the back of the fœtus, and are simply revealed by a certain resistance to the exploring hand. Sometimes the crest of the spinous apophyses can be felt. The shoulder will be recognized by the projection it forms in the vicinity of the cephalic extremity.

With regard to the pelvic or thoracic limbs, outside of the active movements by which they are so frequently manifested, they appear in the form of a tumor, cylindrical or rounded, easily displaced.

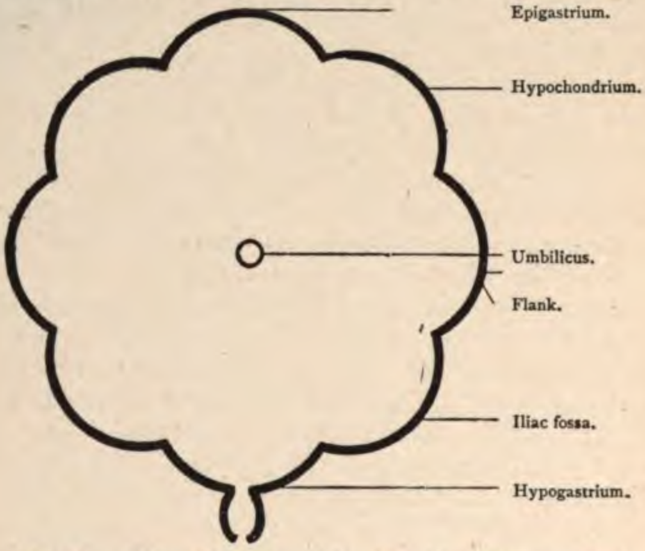


FIG. 163.—Schematic division of the uterus into different regions.

With this knowledge of each fœtal part, we can begin the study of the diagnosis of the presentations and positions by the aid of palpation. The first fœtal part that should be sought, on account of the clearness of the sensations which it furnishes, is the head. When the situation of the head can be exactly stated, fœtal palpation is three-quarters completed. Let us then take up the search for the cephalic ovoid. Fig. 163 shows the different regions of the uterus, each corresponding to an analogous region of the abdomen. Besides the umbilicus, which is the central and median region, the head may occupy:

1. The hypogastrium.
2. The iliac fossa (right or left).
3. The flank (right or left).
4. The hypochondrium (right or left).
5. The epigastrium.

1. *The head in the hypogastrium (mobile or engaged).*—This situation is much the most frequent, for the hypogastrium leads to the parturient canal and vertex presentations are the rule. The head, at the

hypogastrium, may be found in two very different conditions, mobile above the superior strait, or fixed in the parturient canal.

When the head is mobile at the level of the superior strait, more or less approached to it, presentation exists, for the fœtal part is at the entrance to the genital canal, but it may be easily modified, either spontaneously or artificially. When, on the contrary, the head has penetrated into the pelvis, the presentation, without becoming absolutely definite, takes a stability much more marked. Mobile at the superior strait, the head may engage by the vertex, face or brow. Thus it is impossble to exactly state in advance which one of these presentations will become definitive at the moment of engagement. The obstetrician must then be contented to say in such cases, presentation of the cephalic ovoid. But when the head has penetrated into the excavation, mutations of presentations are rare, so that at this moment, save some restrictions, an exact diagnosis becomes possible.

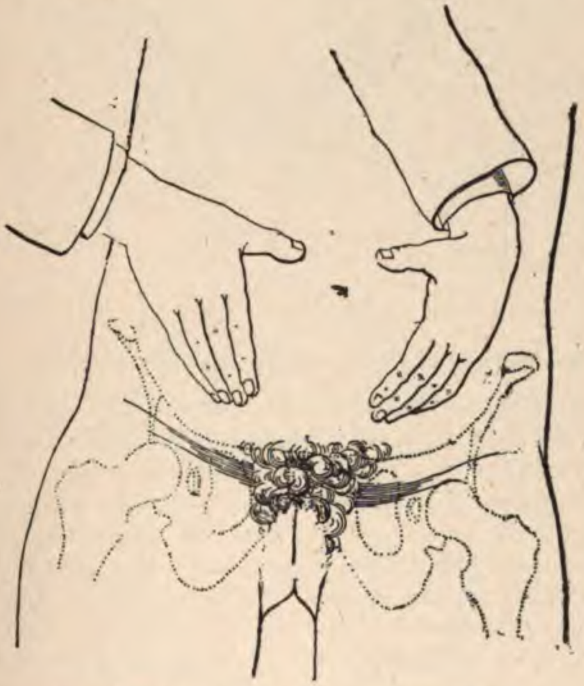


FIG. 164.—Search for the head in the hypogastrium.

Let us examine these different cases. To seek the head in the hypogastrium, the hands are applied as in Fig. 164. At about five centimetres above the superior strait, one seeks, by approaching the extremities of the fingers of the two hands, to grasp the body which may be interposed between them. If the head is found at this level its characters are revealed and it will be more or less mobile. If the head is not met in this first exploration the extremities of the fingers are depressed a little; the superior strait is then sought and, at need, even the excavation. If the head is at this level we find: A. Presentation of the vertex. B. Presentation of the brow. C. Presentation of the face. (The last two exist at the moment of labor).

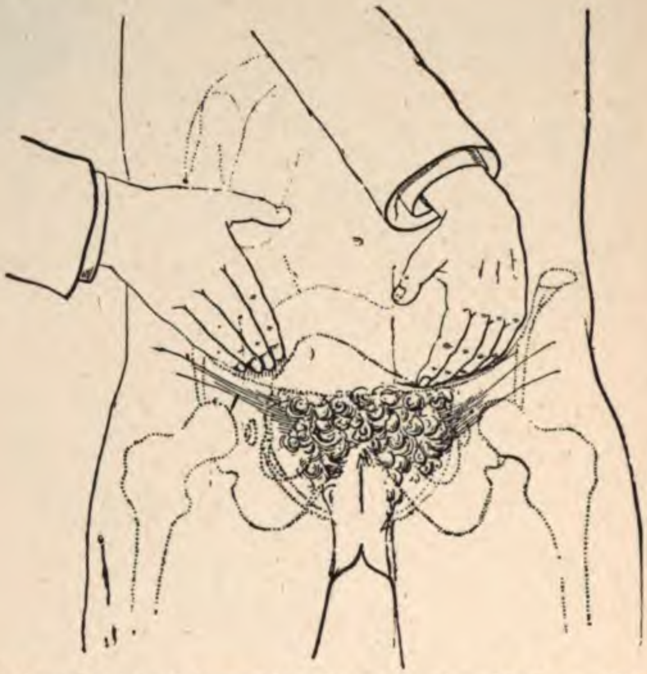


FIG. 165.—Search for the engaged head in presentation of the vertex (Pinard).

A. *Presentation of the vertex.*—On one side the hand finds with difficulty the resisting plane furnished by the head; on the other it is quickly arrested by a projecting tumor, clearly appreciable (Fig. 165). The part of the head difficult to find is the occiput, the other projecting, easily explored, is the forehead. According as the projection is more or less marked, the exploring hand will note whether the forehead is turned posteriorly, transversely or anteriorly. This simple exploration, made with precision, permits the recognition of both the presentation and the position. Exploration of the trunk, which will be explained later, will complete this diagnosis.

B. *Brow presentation.*—On one side is a voluminous tumor, more projecting than the forehead in vertex presentation and here constituted by the occiput (Fig. 166). On the other side is an unequal tumor giving sensation of an incomplete clearness. This is the inferior part of the face and neck.

C. *Face presentation.*—On one side is a projection, relatively large, seemingly constituting by itself all the fœtal head; this is the occipito-parietal projection, the same as found in brow presentations but exaggerated by the extension of the head (Fig. 167).

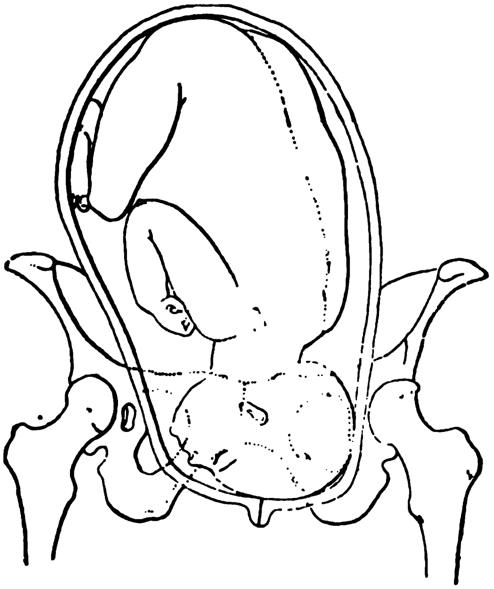


FIG. 166.—Brow presentation with head engaged.

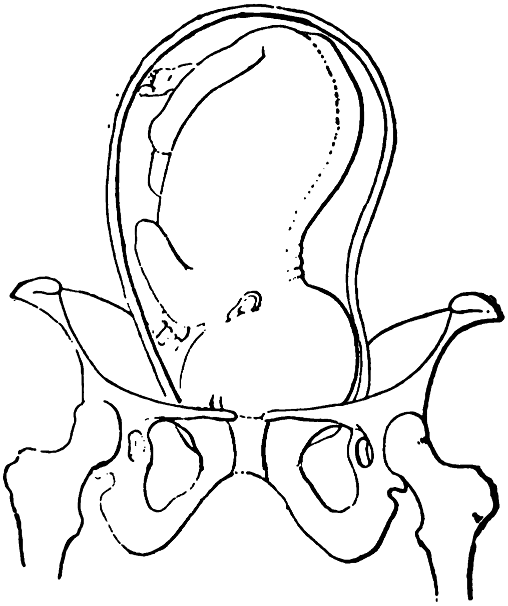


FIG. 167.—Face presentation with head slightly engaged.

This projection is separated from the trunk by a very clear depression. On the opposed side the face is explored with difficulty, though in cases of mento-anterior the inferior maxillary constitutes at this point a sort of horseshoe.

If we compare the three presentations of the cephalic ovoid, we see that palpation of the head gives a projection much more marked on one side than on the other.

Projecting side of the head.—

Vertex.—Frontal region.—Marked projection.
Brow.—Occipital region.—More marked projection.
Face.—Occipito-parietal region.—Very large projection.

Retreating side of the head.—

Vertex.—Occipital region.—Smooth.
Brow.—Face and neck.—Uneven.
Face.—Contour of inferior maxillary.—Uneven.

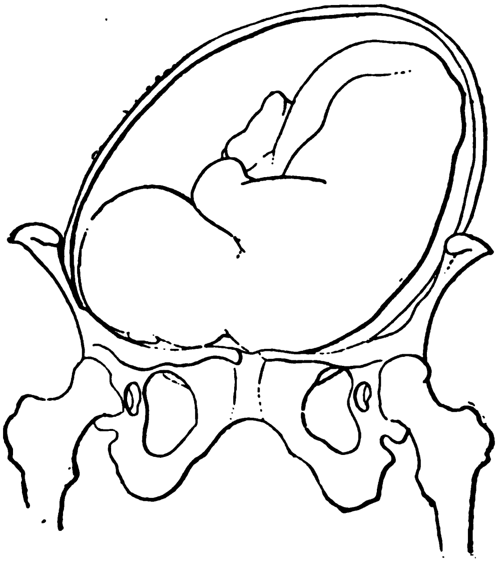


FIG. 168.—Thorax presentation; variety; left shoulder.

In proportion as the head descends into the parturient canal, exploration becomes more difficult. Finally, at a given moment during labor, the head becomes no longer accessible to palpation.

After having recognized and determined the situation of the head, it is necessary to explore the breech and the back to complete the palpation. The breech is found in one or the other hypochondrium, in general in that which corresponds to the brow (with vertex presentation), rarely on the median line at the epigastrium. The back, according as we have to do with a vertex, a brow, or a face presentation, will be found more or less approached to the uterine

Palpation of the shoulder may aid in completing a doubtful fficult diagnosis in some cases.

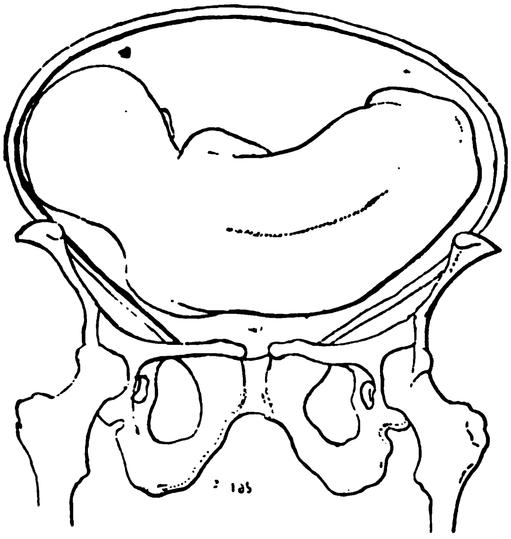
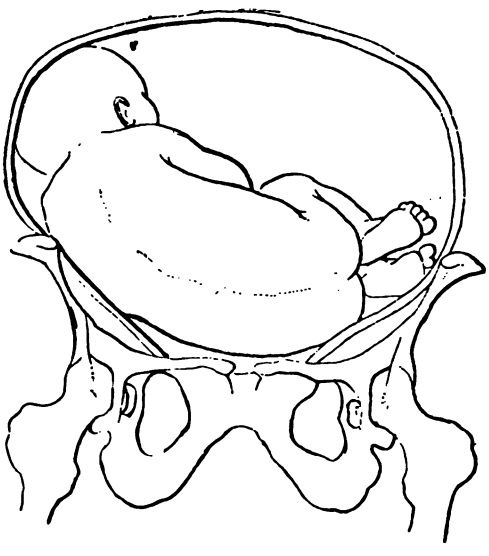


FIG. 169.—Presentation nul (breech and head in the flanks).



170.—Abdomen presentation (breech in the iliac fossa and head in the flank).

The head in the iliac fossæ (*right or left*).—The head is recognized s usual characteristics. The breech is generally situated in ank or in the hypochondrium of the opposite side. According e situation of the back, that is to say of the vertebral column, ave, when it looks forward or backward, presentation of the x, shoulder variety, right or left (Fig. 168); when it looks upward or downward, presentation of the thorax, sternal or dorsal variety. The diagnosis of the presentation will, in general, be possible by palpation, from the exact determination of the head and that of the back. Back to the front, smooth plane. Back to the rear, small parts of the fœtus. Where this last point is difficult to elucidate in a clear manner, we may arrive by palpation at an exact statement of the presentation without being able to affirm the variety.

3. *The head in the flank* (*right or left*).—When the head is in one of the flanks, it can be recognized by palpation from its usual characters. The breech is found in the opposite flank or in the neighboring iliac fossa.

In the first case there is no presentation, for the trunk is distant from the opening of the genital canal (Fig. 169). To constitute a presentation a very marked flexion of the fœtus would be necessary, so that the child will lie in the inferior segment of the uterus, as in a hammock. Then we would have a presentation of the abdomen (Fig. 170).

In the second case (Fig. 171), the breech being in the iliac fossa, if its position is maintained at the moment of labor, we would also have, and more markedly than above, a presentation of the abdomen. But at this moment the breech generally descends into the superior strait, then into the excavation, and presentation of the breech is thus constituted in place of that of the abdomen.

4. *The head is in the hypochondrium* (*right or left*) *or in the epigastrium.*—When the head is at the fundus of the uterus, either at the epigastrium or in one or the other hypogastrium, the breech is found at the entrance to the parturient canal, that is, there exists a presentation of the breech.

The head most often occupies the hypochondrium toward which is turned the anterior plane, or the sternum of the fœtus, the same as the breech in presentations of the vertex.

The *complete* breech does not engage in the excavation during pregnancy. This is not so with regard to the breech in the incomplete variety of the buttocks, that is found below the superior strait during the ninth month, and might be mistaken for the vertex in a rapid examination.

Palpation, of the head in the fundus of the uterus, of the breech in the hypogastrium or engaged in the excavation, and finally, of the back, placed to the right or to the left, permits us to state exactly the fœtal situation, and to determine the presentation as well as the position.

By palpation we can also recognize whether the breech is complete or incomplete variety, the volume of the fœtal part being more considerable in the first case, and the feet being sometimes perceptible in the vicinity of the head in the second.

Palpation also affords exact information on the diagnosis of twin pregnancies, on the death of the fœtus, and as to different pathological states.

Some words on the difficulties of palpation and we shall have finished with this method of exploration. These difficulties may be met at each one of the three portions that have been discussed.

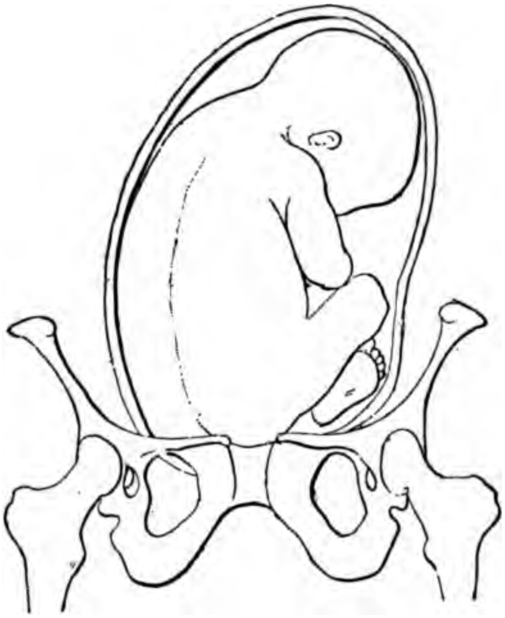


FIG. 171.—Complete breech presentation R S I A.

1. *Præuterine.*—Fatty infiltration of the abdominal wall makes the sensation obscure in obese women. Exaggerated sensitiveness of the abdominal wall may obstruct palpation to such a point that in cases where precision of diagnosis is indispensable it is necessary to have recourse to anæsthesia. Uterine anteversion may render fœtal palpation very difficult. In this case the fundus of the uterus must be pushed as far backward as possible.

2. *Uterine.*—Tumors of the uterine wall (multiple fibroids), rigidity of this wall in primiparæ, or in hydramnios of twin pregnancy, obstruct the hand in exploration of the fœtus. This may also occur from too frequent contractions of the uterus during pregnancy and especially during labor.

3. *Intra-uterine.*—An excess of the amniotic liquid, twin pregnancy and death of the fœtus are causes of difficulty that experience alone can surmount.

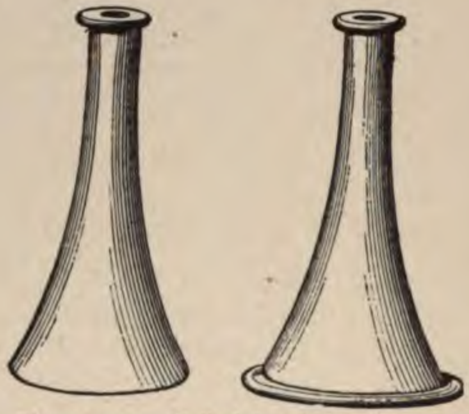
4. **Auscultation.**—From experience it has been learned that by applying the ear to the abdominal wall of a woman toward the term of pregnancy, there can be heard four varieties ofsounds:

A. A maternal souffle, - - -	Mother.
B. A fœtal double pulsation, - -	Fœtus.
C. Fœto-funicular souffle, - -	
D. Sounds of fœtal movements, - -	

Before beginning the study of these sounds, some preliminary words on the mode of practicing obstetrical auscultation will be useful.

Preliminaries.—The woman should be placed in the same position as for palpation (or better *left* in this position), since digital exploration and auscultation generally follow palpation. The accoucheur remains likewise on the right side of the woman, but may change sides to complete his examination.

Auscultation is either immediate or mediate: *Immediate*, when the ear is directly (or better, with the linen or the chemise intervening) applied to the abdomen. *Mediate*, when a stethoscope is interposed between the ear and the abdomen. This last method is generally preferred, as less offensive to the woman's modesty and as furnishing clearer and more exact results.



Figs. 174, 175.—Bell of obstetrical stethoscope.

The choice of a stethoscope is not a matter of indifference; those employed for the thorax are not so favorable for obstetrical auscultation. The essential condition of a good obstetrical stethoscope is that it shall have a large bell, for example, like that represented in Figs. 174 and 175. With these preliminaries we may procèed to the study of the different puerperal sounds.

A. *Maternal souffle.*—The maternal souffle presents several important characteristics:

It is *intermittent* and synchronous with the pulse of the woman. If the uterus is auscultated at the same time that the finger explores the radial artery, at the moment the pulse is felt at the wrist the ear hears a sound which occupies a duration of one-quarter, one-third, or one-half of a cardiac revolution.

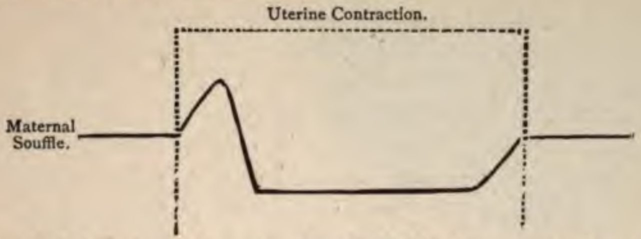


FIG. 176.—Evolution of the maternal souffle during uterine contraction.

Its *timbre* is variable; sometimes acute, sometimes grave, sometimes musical. It may be situated at any point of the uterine surface, but is heard most often over the sides, or at the border of the insertion of the broad ligaments. Its site is sometimes single, sometimes double, sometimes multiple. When following uterine contraction, it undergoes an augmentation of intensity, then sinks below normal, to resume its first intensity when the contraction is ended. These variations are put in schema form in Fig. 176.

This souffle appears generally at the beginning of the second three months of pregnancy, augments up to the commencement of the third three months, when it attains its apogee, and decreases from this time (Fig. 177).

1. *Aorto-iliac theory* (Hans, Bouillard).—The souffle is produced in the aorta and in the iliacs compressed by the uterus. If this were so it would be impossible to find the souffle at any point of the uterine surface, notably above the pubis where it is often met.

2. *Epigastric theory* (Kiovisch, Glenard).—These two authors have localized the maternal souffle in the epigastric arteries.

The objection made to the preceding theory applies equally to this and demonstrates its untruth. Glenard has, besides, abandoned his theory, placing in the puerperal artery that which had formerly been attributed to the epigastric; the puerperal artery being a dependent of the uterus, this author is thus ranged in the uterine theory, which will be exposed later.

3. *Placental theory* (Laennec, Monod).—The possibility of having two or three distinct spots where the maternal souffle can be heard invalidates this theory.

4. *Uterine theory* (P. Dubois).—This is the generally admitted theory, localizing in the vessels of the uterus the origin of the maternal bruit or souffle; thus it is often called the *uterine* souffle. But, though in accord on the principle, authors differ as to what variety of vessels is involved. The schema Fig. 179 represents the succession of uterine vessels showing the divisions, and the authors cited have been placed opposite the variety of bloodvessels advanced as a cause.

A physical law proves that a sonorous sound is produced when a fluid circulating in a tube passes from a narrow region into an enlargement; this law demonstrates that P. Dubois is correct in supposing that the maternal souffle arises at a moment when the blood empties from the capillaries into the sinuses. Besides, it is not impossible that the other uterine vessels compressed accidentally by the stethoscope, by a tumor, by a fœtal part, or by any analogous cause, may be equally the source of a maternal bruit.

The maternal souffle, then, takes origin in any point of the uterine bloodvessels, but preferably at the union of the capillaries with the sinuses.

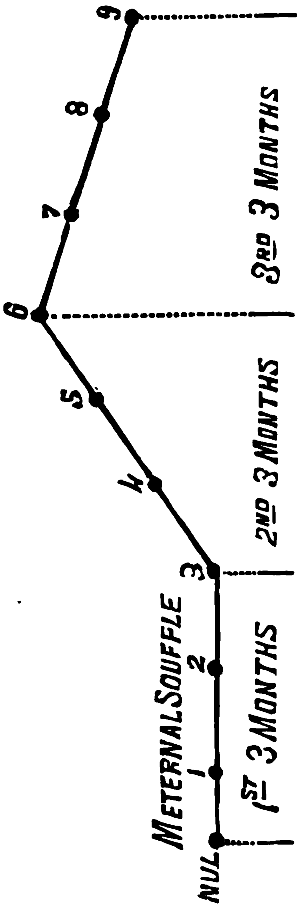


FIG. 177.—Evolution of the maternal souffle during the different months of pregnancy.

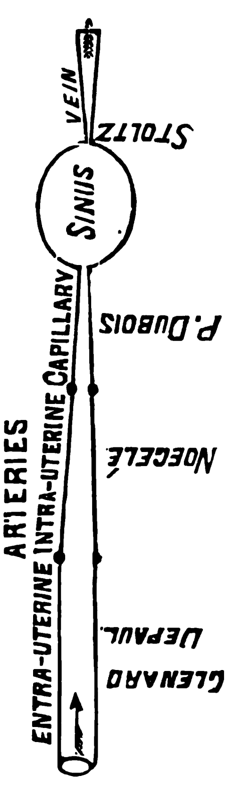


FIG. 179.—Schema of the uterine bloodvessels: artery, capillary, sinus, vein.

B. *A fœtal double pulsation.*—When practicing auscultation of the fœtal heart, the sounds of which have been compared to the remote ticking of a watch, there is heard (Fig. 180):

1. A first sound, tolerably strong.
2. A short silence.

3. A second sound, more dull.
4. A long silence.

The fœtal heart beats on the average one hundred and forty times a minute; one will hear, the double sound in question one hundred and forty times a minute. The number of pulsations being about seventy in the adult, it will be seen that they are double this number in the fœtus.

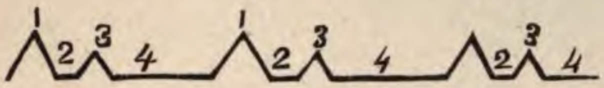


FIG. 180.—Fœtal heart sounds.

The number of fœtal pulsations may present quite extensive variations:

Physiological limits { Maximum, 160.
Minimum, 120.

Pathological limits { Progressive diminution, 100, 90, 60, etc., to fœtal death.
Augmentation to 190, 200, in cases of intense fever of the mother.

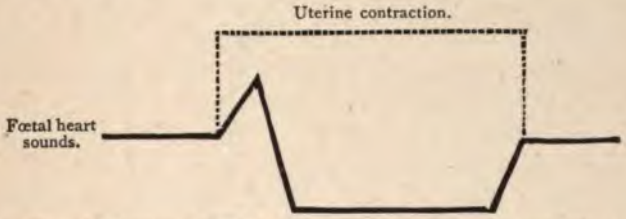


FIG. 181.—Evolution of fœtal heart sounds during uterine contraction.

During uterine contraction, the frequency is exaggerated momentarily at the beginning, then diminishes sometimes to such a degree that the ear perceives no sound. The obstetrician should not forget this peculiarity, which may lead to a belief that the condition of the fœtus is serious, when there is only a passing modification. Fig. 181, in schematizing the variations of the fœtal heart sounds during uterine contraction, shows the analogy with that taking place in the maternal bruit.

During the first three months of pregnancy, it has never been possible to hear the fœtal heart sounds. Exceptionally they can be perceived during the fourth month, but more often during the first half of the fifth month; it is in general, however, at about the middle of pregnancy that they become distinctly perceptible; their clearness progresses to the end of gestation as in the schema, Fig. 182, which sums up what we have said.

The perception of the the fœtal heart sounds permits us to affirm the *existence of pregnancy and that the fœtus lives.* However, this sign may be attached to certain causes of error; thus the maternal cardiac pulsation transmitted to the abdomen may be mistaken for the fœtal heart sounds. To avoid this confusion it is sufficient to explore the maternal pulse while auscultating the mother; the synchronism indicates the maternal origin of the sounds. From this comes the very important precept: Never auscultate the fœtus without taking the maternal pulse at the same time. In difficult cases, the obstetrician who fears a confusion with the throb of his own arteries (arteries of the head, in particular the temporal) will avoid all source of error by taking his own pulse simultaneously.

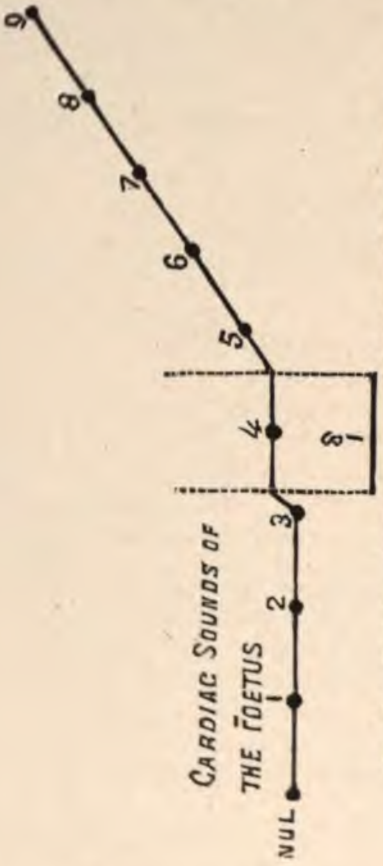


Fig. 182.—Evolution of the cardiac sounds of the fœtus during pregnancy.

These causes of error, it is seen, are very easy to avoid, and hence the exellence of the fœtal heart sounds as a positive sign of pregnancy. The perception of these sounds permits, besides, a watch over the life of the fœtus, and during labor furnishes the physician important knowledge as to the necessity of prompt intervention when a life is in danger.

It has been pretended also that by the aid of auscultation one could recognize during pregnancy the *sex* of the fœtus. In 1859 Frankenhauser advanced the following relation: More than one hundred and forty-four pulsations to the minute, a girl; less than one hundred and forty-four pulsations, a boy. Taking up this question again in 1879 Danzats modified the preceding conclusion. More than one hundred and forty-four pulsations to the minute, a girl; less than one hundred and thirty-five, a boy. Danzats created thus between one hundred and forty-four and one hundred and thirty-five pulsations a neutral zone where diagnosis was impossible. From the researches of Budin and Chaignot, made the same year, it resulted that these figures had no utility in practice, and that it is necessary to renounce all ideas of diagnosticating the sex of the child during pregnancy by auscultation or by any of the other means proposed to this end.

Finally, fœtal auscultation permits us to verify the *diagnosis of the presentation and position* made by palpation, and this study will terminate the subject of fœtal heart sounds. The sounds of the fœtal heart are heard within a zone more or less extended on the abdominal wall, a zone which represents a circle of ten to fifteen centimetres diameter. In proportion as the ear or stethoscope is approached to the center of this circle, the sound becomes clearer and stronger. This region, where the heart sounds are particularly clear, is called the *focus of auscultation*. This focus is usually single; however, as will be seen later in a simple pregnancy, it may be double, as in the case of twins. The foci of auscultation will vary with the situation of the fœtal heart; that is, each presentation and position will have its special focus. Let us study these different foci by commencing with the presentation of the cephalic ovoid.

1. *Vertex.*—I will suppose the vertex engaged in the excavation (we will see later that the height of the focus of auscultation varies with the degree of engagement). I use as a diagram a series of lines which take the umbilicus as a starting point and dispose themselves in a fan shape to the different points of the pelvis, as follows (*id.* both sides):

Antero-superior iliac spine.	Superior ilio-umbilical line.
Antero-inferior iliac spine.	Inferior ilio-umbilical line.
Ilio-pectineal eminence.	Umbilico-pectineal line.
Pubic spine.	Umbilico-pubic line.

Total: eight lines.

It is on the paths of these eight lines that we find the foci of auscultation of the eight positions of the vertex.

Schema 183 represents the site of the different foci of auscultation at the point where each one interrupts a line; the name of the position is given at the side.

It will be remarked that for L O P there exists two foci. This is the only position where this peculiarity exists. The line on which is seated the left focus is found above the left superior ilio-umbilical (supplementary line). In proportion as the back of the fœtus turns posteriorly the right focus becomes more and more clear, and, on the contrary, it is that of the left that becomes louder when the back is directed forward, approaching L O T.

To reconstruct this schema from memory it is sufficient to recall that the focus of L O A (the line of which is expressly accentuated) *is found on the left inferior ilio-umbilical line.*

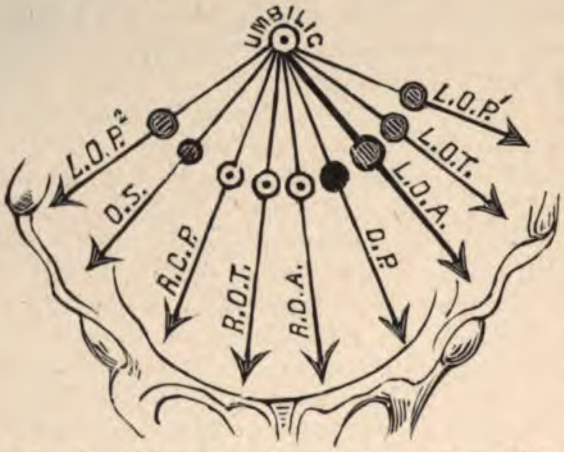


FIG. 183.—Vertex. Foci of Auscultation. Stethoscopic Fan.

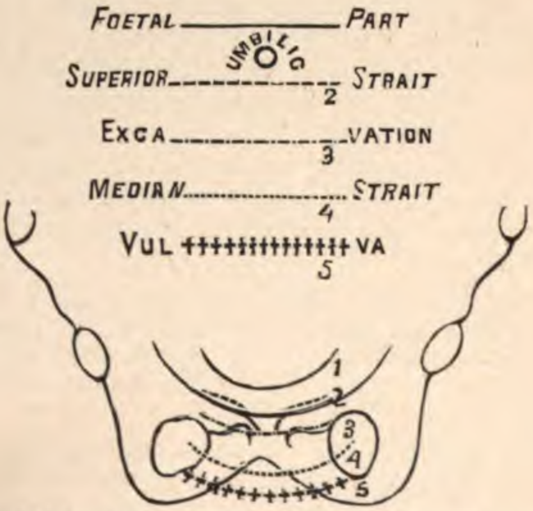


FIG. 184.—Height of foci of Ausculation varying according to the degree cf engagement of the fœtal part. (The inferior lines indicate the height of the fœtal part which presents and the superior analogous lines the height of the foci of auscultation which corresponds to them.)

What has been said applies to cases where the vertex is engaged in the excavation. But what is the site of the different foci when engagement has not taken place or when, on the contrary, the head has arrived at the vulva? Fig. 184 responds to this question; it is destined to show the relative height of the foci of auscultation, following the degree of engagement of the fœtal part; the upper black line corresponds to the fœtal part free.

These different heights being known it is sufficient to return to Fig. 183 and transport, parallel to itself, each of the foci, either upward or downward, according to the degree of engagement; thus we will have the successive positions occupied by the foci during the successive descent of the head.

Examples: In L O T, head mobile above the superior strait, the focus will be in A.

In O S, head fixed at superior strait, the focus will be in B.

In O P, head at the vulva, the focus will be in C (Fig. 185).

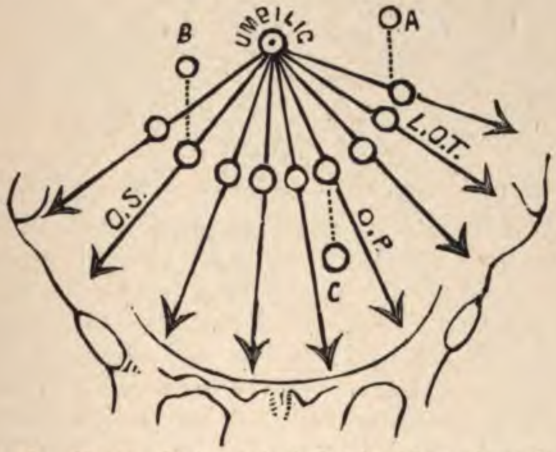


FIG. 185.—Vertex. Variations in the height of focus of auscultation according to the degree of engagement of the fœtal part.

2. *Face.*—I proceed likewise for the determination of the foci in the positions of the presentation of the face, supposing that labor is advanced so that the fœtal part is in the excavation. The stethoscopic fan is given in Fig. 186. The mnemotechnic mark here is the L M A line, the same as L O A for the vertex. The R M P is here analogous to L O P as to a double focus, for the cardiac region of the fœtus is equally distant, right and left, from the abdominal wall. Although this double focus has not been described, it is probable that it exists and for my part I have been able to recognize it in a similar case. With regard to the height of these different foci, according to the degree of engagement, I return to what has been said of the vertex. Fig. 184 applies as well to presentations of the face as to those of the vertex.

3. *Forehead.*—The different foci of auscultation in presentation of the forehead are not sufficiently known to allow me to touch

upon their description. They demand new study. Each presentation of the forehead being intermediate between a presentation of the vertex and of the face, one can take a point situated on the middle of a line reuniting the two foci of corresponding presentations and approximately fix the site of the one sought.

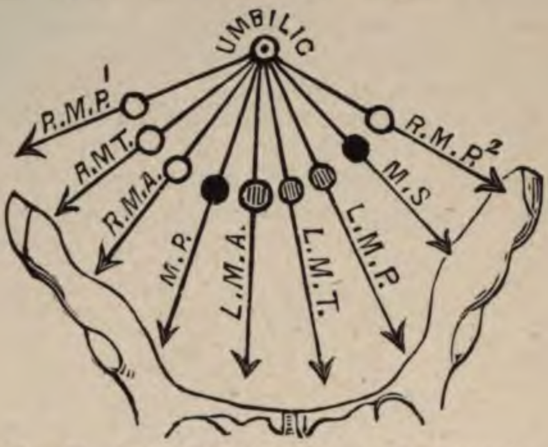


FIG. 186.—Face. Foci of auscultation. Stethoscopic fan.

4. *Breech.*—I suppose the breech engaged in the excavation, the foci are disposed in a fan (Fig. 187) analogous to those of the face and vertex. For R S P I have marked two foci of auscultation which exist probably as in L O P or R M P, but this fact has not been verified. The line L S A is that from which the fan can be reconstructed from memory. With regard to the height of the foci, I will repeat that which has been given for the vertex and face, for since the researches of M. Ribemont, it has been shown that in a fœtus doubled on itself, as it is in the uterine cavity, the heart is equally distant from the vertex and from the breech; the height of the focus of auscultation will be the same for the vertex and for the breech with equal degrees of engagement. Presentation of the breech being very rarely accompanied by engagement during pregnancy, it will be understood that the foci of auscultation will be found in parallel circumstances above the umbilicus.

5. *Thorax.*—Shoulder presentations, other than the varieties of the right or left shoulder, being rare, we have only at present determined the foci for these two varieties, and in their two most usual positions, that is, the right and the left acromio-iliac transverse, R A T and L A T.

6. *Abdomen.*—The great rarity of these presentations has not yet permitted us to determine the foci of auscultation.

Besides the engagement of the fœtal part, there are other causes which may produce variation in the situation of the foci of auscultation, such as *lateral inclination* of the uterus, or, again, *anterior* *inclination*, which, for example, notably lowers the focus in L O T, when it is pronounced. All these variations are complications, but the physician should never forget their possibility, in order to keep in mind certain apparent anomalies, the details of which are too extended to produce here. The knowledge of the preceding foci as described is not sufficient alone for diagnosis of presentation and position, but it permits us, diagnosis being first made by palpation, to obtain verifications by the aid of the ear, and enables the assurance that the focus is placed in the situation indicated for the supposed presentation and position. A focus placed in another region puts one on the track of an error committed and leads to the necessary rectification.

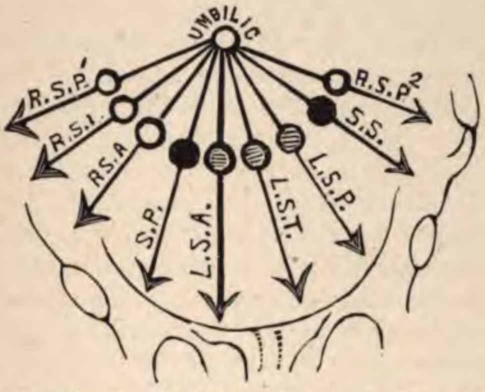


FIG. 187.—Breech. Foci of auscultation. Stethoscopic fan.

C. *Fœto-funicular souffle.*—At the same time with the fœtal heart sounds, there is sometimes heard a blowing sound, usually single, exceptionally double. This souffle differs essentially from that previously studied (maternal souffle), and is easily distinguished from it, for the first is synchronous with the pulsations of the mother, the second, with the fœtal pulsations.

The fœto-funicular souffle recognizes, as its name indicates, a double origin: Either the fœtus, cardiac (heart) souffle; or the cord, funicular (vessels) souffle. The *cardiac souffle* of the fœtus is due either to a lesion of the valvular orifices, as in adults; to an insufficient permeability of the foramen ovale; or, with a normal heart, to modifications in the blood, producing sounds analogous to those which are designated under the name anæmic in the adult, and the pathology of which is still unknown.

The *funicular souffle*, exceptionally caused by the semilunar folds which exist in the umbilical vessels, is generally due to compression of the cord, either between the back of the child and the uterine wall, or by circular constrictions. Charrier, in making of this souffle a sure sign of circular constriction of the cord, has been much too positive, and is unwise in proposing premature artificial labor in such cases to save the life of the child.

We do not possess exact and sufficient symptoms to enable us to recognize the different varieties of fœtal cardiac souffle, so that all the ambition of the obstetrician should be confined to distinguishing a fœtal souffle from a funicular souffle, and yet this diagnosis is not always possible. The cardiac souffle has its maximum of intensity at the focus of auscultation of the fœtal heart, and, on the contrary, the funicular souffle has its maximum of intensity situated at a different point, in the region of the cord. This sign is that which will better permit the differentiation; those distinctions which are based on the intensity or the variability of the murmur furnish only an incomplete security. The fœto-funicular souffle has, in the point of view of the existence of pregnancy, the same semeiological value as the fœtal heart sounds—it indicates the presence of a living fœtus, but its importance is very small compared with the existence of the fœtal heart sounds, so clear and easy to find.

D. *Sounds of fœtal movements.*—In practicing auscultation during a certain time there is perceived sometimes a *rustling*, analogous to that produced by the two hands applied on the ear when a slight movement is given to the outer one. Sometimes a *shock* is heard, sudden and dull, like that obtained when striking with one finger on the hand covering as before the pavilion of the ear. Occasionally these shocks take a peculiar regularity, as if the fœtus pulsated slowly in the interior of the ovular cavity (*rhythmic movements*). The rustlings are due to the displacements of the fœtus in totality; the shocks, to movements of small fœtal parts which strike the uterine wall; the cause of the rhythmic movements is ignored, besides they have no special semeiological value. The sounds of fœtal movements commence with the movements themselves, that is, at the beginning of the fourth month of pregnancy, but they are not clearly perceptible until about the middle of the fourth month. Like the fœtal heart sounds, they constitute a positive sign of the existence and the life of the fœtus. However, it is important not to confuse them with intestinal sounds, nor with the shocks which abdominal muscular contractions may give to the stethoscope. These causes of error can only be avoided in the second half of pregnancy, when the perception of the fœtal shock had become clear and distinct; but at this time this symptom, which would be important if unique, generally loses its advantages by the appearance of other signs of pregnancy more easily appreciated.

5. **Digital examinaiton.**—The uterus is directly accessible by the vagina, indirectly by the rectum and bladder, in such a way

that the finger penetrating into these different cavities may furnish valuable information on the gestating organ and its contents. This exploration is dependent upon the sense of touch. It is then only a variety of palpation. One is internal, the other is external. In these internal explorations the fingers are in contact with the mucous membrane, in palpation they are in contact with the integument.

Digital examination can be made:

1. By the urethra and bladder—vesical touch.
2. By the anus and rectum—rectal touch.
3. By the vulva and the vagina—vaginal touch.

I shall be brief as to the first two and shall dwell, on the contrary, on the last.

1. *Vesical touch* requires a previous dilatation of the urethra, an operation which prevents its use in pregnancy.

2. *Rectal touch*, practiced after a previous evacuation of fecal materials, gives information on the volume of the uterus, on the exact situation of tumors placed behind it and on some other points of secondary importance. It should be resorted to when vaginal examination is difficult or impossible on account of some obstacle, such as vaginismus, retraction or cicatricial obliteration of the vagina, intact or too narrow hymen. But these conditions are exceptions and in the great majority of cases vaginal touch will be used.

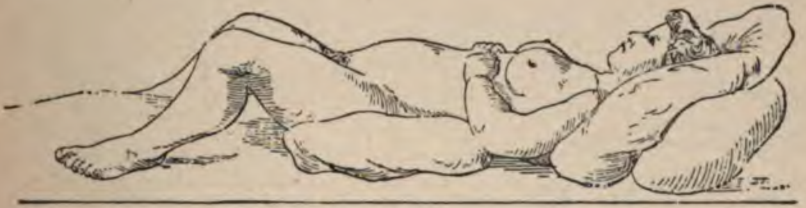


FIG. 189.—Dorsal position.

3. *Vaginal touch* may be performed with the woman in the upright position or lying down. The upright position permits a rapid and summary examination, but very incomplete. The horizontal position is the only one which allows a conscientious and satisfactory examination and, except in rare cases, it should always be used.

The woman should be placed in the same position as for palpation, or rather left in this position, since one generally practices digital examination after palpation and auscultation, there is simply needed a slightly more marked separation of the thighs (with slight flexion and the elevation of the buttocks with the aid of a cushion *dorsal position*) (Fig. 189). Such is the French position. In England the woman is placed on the left side, the thighs flexed at a right angle on the trunk, the upper one a little more than the lower (*lateral position*) (Fig. 190). Exceptionally, and in certain pathological conditions, the woman is placed on the knees and elbows (*genu-pectoral position*) (Fig. 191).

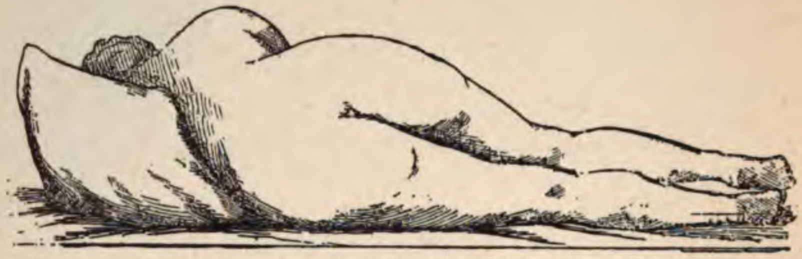


FIG. 190.—Lateral position.

Let us suppose the woman in the dorsal position and proceed to digital examination. Exploration may be made with either hand, by preference with the right, the most used; in this case the physician places himself at the woman's right. It is important for this to place the woman in her bed so that her right side is easily accessible.

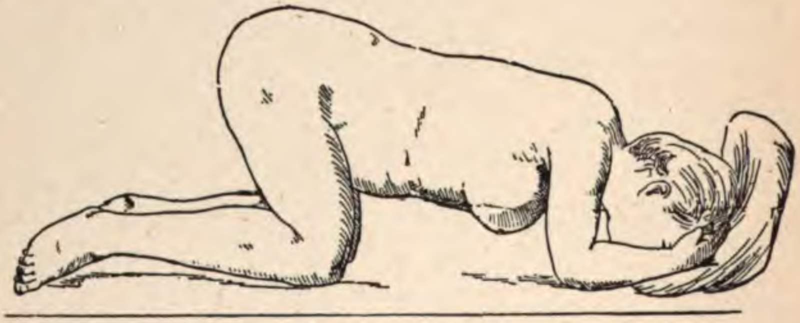


FIG. 191.—Genu-pectoral position.

Digital examination or touch may be:

Unidigital: practiced with the index finger, the other fingers being flexed and folded in the hollow of the hand (Fig. 192).

Bidigital: index and middle finger (Fig. 193). The introduction of two fingers gives greater length, the middle finger permitting deeper penetration, and may be used in multiparous women without inconvenience. In a primiparous women this simultaneous introduction is often painful and should be avoided.

Manual: the whole hand can be made to penetrate into the genital organs, usually to explore the contents of the uterus, in case of vicious presentation for example. The hand, disposed as in Fig. 194, can scarcely ever be introduced without anæsthesia.

While one hand practices vaginal touch, the other should always be placed on the abdomen, combining and completing the exploration. The finger that is introduced into the genital organs should be aseptic and covered with an oily substance to permit an easy gliding (vaseline, oil, cold cream, cerate, etc.).

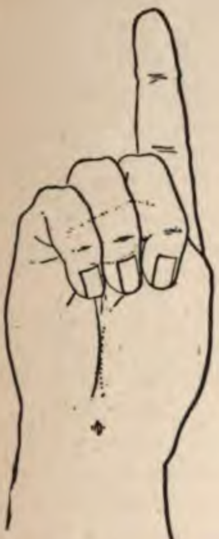


FIG. 192.—Unidigital touch.

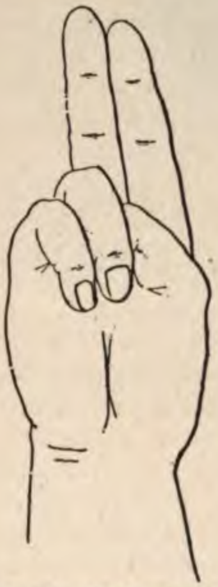


FIG. 193.—Bidigital touch.

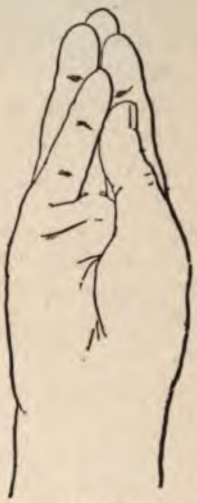


FIG. 194.—Manual touch.

Vaginal touch is executed, like palpation, by a series of examinations:

1. Vulvar.
2. Vaginal.
3. Uterine.
4. Periuterine.
5. Pelvic.

The pelvic exploration is only a variety of the periuterine, but I separate them for the clearness of description.

We shall study first digital examination on the non-pregnant woman, to note the changes caused progressively by the development of the ovum.

A. Vaginal touch in the non-pregnant woman.—1. *Vulvar.*—The vulva being easily accessible to vision, the obstetrician will derive more information from exploration of the region by the eye than by the finger. There are two orifices that it is necessary to become familiar with by touch, the urethral for catheterism and the vaginal which conducts the finger toward the cervix. Exploration is commenced by search for the vaginal orifice. For this the finger will be held vertically, direct along the inner surface of the thigh, until in contact with the vulvo-perinæal region where the vulvar opening is detected. At this moment the finger is generally in contact with the perinæum and by ascending a little the vaginal orifice is reached. To determine the situation of the urethral orifice, the finger, after having found the vaginal orifice, explores the vestibule from below upward and meets a small opening, which with a little experience can be easily recognized.

2. *Vaginal.*—The finger in passing through the vagina passes successively the vulvo-vaginal orifice and the muscular ring constituted by the coccy-perinæal levator. Continuing on its way the finger following, sometimes the anterior wall, sometimes the posterior wall, sometimes the right or left lateral wall, arrives in the corresponding culs-de-sac which surround the cervix. I only note in passing the importance of seeking carefully for double vaginas, which often pass unnoticed.

3. *Uterine.*—To attain the cervix in difficult cases, it is necessary, the buttocks of the patient being elevated:

a. To depress the elbow to the plane of the bed, thus giving the finger a proper direction.

b. To separate successively the labia majora and minora of each side, in such a way as to insinuate the hand between them; by this manœuvre one can easily penetrate a finger's breadth farther.

When the cervix is examined, the anterior, lateral and posterior surface of the uterus can be explored, by successively depressing each cul-de-sac, while the abdominal hand affords a support from above downward in an umbilico-coccygeal direction.

4. *Periuterine.*—By depressing the vaginal wall, circularly from the posterior to the anterior cul-de-sac, the finger meets:

The rectum.
The ovary }
The tube } Broad ligament.
The round ligament }
The bladder, ureter, urethra.

The exploration of the ovary, of the tube, and especially of the round ligament and the ureter demands great experience, and sometimes the most experienced finger can not perceive them. The direction in which the finger leaving the uterus will meet the different organs is indicated by Fig. 195. These different organs are more easily found when they become the seat of a pathological change and it is also in such circumstances that their exploration becomes useful.

5. *Pelvic.*—By strongly depressing the vagina and the contiguous soft tissues, one can, without actual pain to the woman, explore the pelvic wall and even arrive at the superior strait and at the sacro-vertebral angle. The great importance of this examination will be comprehended in the study of the pathological pelvis.

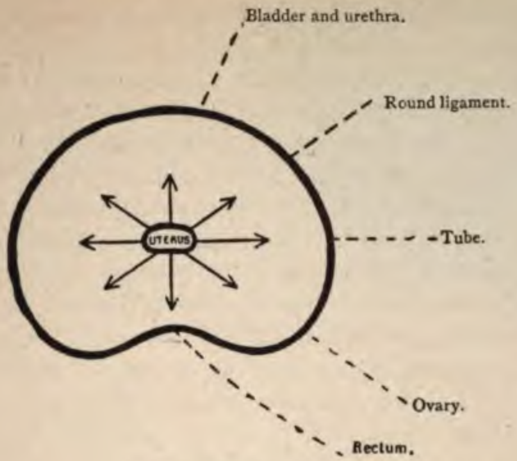


FIG. 195.—Periuterine touch.

B. Vaginal touch during pregnancy.—We shall follow the different steps indicated above, noting the modifications caused by conception.

1. *Vulvular.*—There is no important change outside the hypertrophy of its elements.

2. *Vaginal.*—I simply recall the circular fold which is sometimes formed at an advanced period of pregnancy. The finger often finds small projections in the vaginal wall, a little larger than the head of a pin. These are the result of granular vaginitis, a frequent affection of pregnancy, manifested as a blennorrhagic vaginitis by a yellowish leucorrhœa, but absolutely distinct with regard to its nature and it is not venereal, although it relates to microbes.

3 *Uterine.*—At an advanced period of pregnancy, when the cervix is completely softened and its consistency identical with that of the vagina, even a practiced finger may meet actual difficulty in cervical exploration. To find the cervix in difficult cases it is necessary to follow the vaginal fundus in different directions; in this series of successive explorations the finger will meet the organ and recognize its orifice.

The finger permits us to verify the modifications of the cervix and of the body of the uterus (hypertrophy and softening). The softening of the cervix and the augmentation of the volume of the body of the uterus are, at the beginning of pregnancy in the absence of positive symptoms which do not exist at this period, valuable indices for diagnosis.

Toward the middle of pregnancy appears the ballottement, called vaginal in distinction from abdominal. When the finger placed in the cervix, or in one of the culs-de-sac (preferably in the anterior), impresses a slight push from below upward, it has the sensation of a hard body which retreats and, at the end of some seconds, strikes upon the finger in resuming its first position. This sensation of retreat and return is balottement. It is generally produced by the head of the fœtus, exceptionally by the breech, sometimes by another fœtal part. Very exceptionally ballottement may be perceived at the beginning of the second three months of pregnancy. In general it is only felt after four months and a half, and it becomes especially clear during the seventh month; during the ninth month it is met no longer unless there is hydramnios, for the fœtus becomes too heavy and too closely surrounded to retreat before the pressure of the finger (Fig. 196).

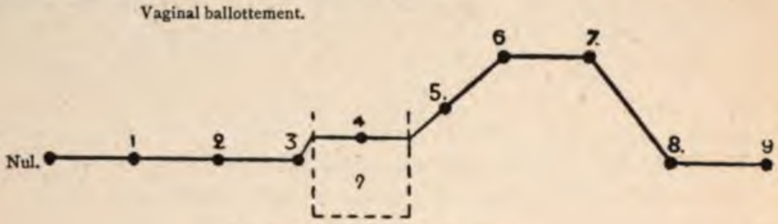


FIG. 196.—Vaginal ballottement.

Is vaginal ballottement a positive sign of pregnancy? An analogous ballottement may be produced by a large vesical calculus, or by the body of the uterus in anteflection and very mobile on the cervix, or again by some periuterine tumor. Like all other positive signs, vaginal ballottement has then its sources of error, but these are avoided if, as in abdominal, all ballottement is eliminated that is not produced by an intra-uterine tumor. Vaginal ballottement produced by an intra-uterine body is, then, a positive sign of pregnancy. By this restriction the above-mentioned sources of error will be avoided, i. e., those belonging to periuterine or uterine tumors, for none of them are intra-uterine.

But it is asked, How may we be assured that the tumor is intra-uterine? This is decided by attentive exploration of the inferior segment of the uterus, and in doubtful cases, by waiting a contraction by which we may be assured that the tumor explored is contained in the uterus. There may be doubtful cases where the obstetrician may be unable to decide, but this is no reason for eliminating ballottement from the positive signs, for with such reasoning there would remain no positive signs, not even the sounds of the fœtal heart, which are sometimes too vague to be affirmative.

Digital examination also permits, at a sufficiently advanced period of pregnancy, recognition of the characters of the fœtal part which presents. When this relates to the vertex there is a smooth, even, hard tumor, usually engaged in the excavation. When there is presentation of the brow, the tumor is also smooth but not engaged. In a face presentation, the tumor is somewhat unequal, with a smooth forehead and regular at the side. There is no engagement (very exceptional during pregnancy). The breech is recognized by tumor, less hard than the head and less equal, accompanied by small parts and not engaged when the breech is complete, often engaged on the contrary, when it is incomplete. With a presentation of the thorax or abdomen the fœtal part is usually inaccessible during pregnancy.

In many cases the details of the fœtal presentation can be felt through the uterine segment and to this I shall return apropos of examination during labor, when the cervix is open. In some cases of great permability of the cervix, the exploring finger arrives at a fœtal part simply covered by the membranes, and clearly recognizes the presence of a child by noting a hand, a foot, an osseous suture, a fontanelle or the ocular globe. The clear perception of a fœtal part by vaginal touch is a positive sign of pregnancy, but it is of service only in relatively rare cases.

4, 5. *Periuterine and pelvic.*—The bladder and the uterus may also be explored by the finger during pregnancy, although the bladder often ascends above the pubes. With regard to the broad ligaments and the organs they contain, their ascension with the uterus renders them inaccessible to vaginal examination. I only mention the examination of the pelvis, in which pregnancy causes no modification perceptible to touch in the normal state. (The pathological modifications will be stated under puerperal pathology.)

CHAPTER VII.

THE DIAGNOSIS OF PREGNANCY.

The various signs of pregnancy which we shall now study in detail are divided into two categories:

1. The first, dependent on the mother, are called probable or presumptive signs, for if they afford a suspicion of pregnancy and render it probable, they do not authorize its affirmation.

2. The second, dependent on the fœtus, are termed positive signs, for their presence places pregnancy beyond doubt.

I shall only recall these various signs, as we are now familiar with them and as their value has been discussed in describing them.

A. Probable or maternal signs.

1. *Genital system and vicinity.*
    - *Uterus.*—Suppression of the menses.
        - Progressive increase in size.
        - Special softness of the body and of the cervix.
        - Intermittent contractions.
        - Existence of the maternal souffle.
    - *Vagina.*—Vaginal pulse.
        - Violaceous coloration.
    - *Vulva.*—Hypertrophy.
        - Violaceous coloration.
    - *Abdominal wall.*—Increase in size of the abdomen.
        - Linær albicantes.
        - Pigmentation along the linea alba.
        - Umbilicus: Depression, then flattening, sometimes projections.
    - *Breasts.*—Increase in size.
        - Projection and exaggerated sensitiveness of nipples.
        - Flow of colostrum.
        - Hypertrophy of Montgomery's tubercules.
        - Pigmentation of the areolæ, and formation of the secondary areola.
        - Lineæ albicantes.
2. *Nervous system.*
    - Modifications of the senses of the intellect and of the will (abnormal desires).
3. *Respiratory system.*
    - Dyspnœa.
    - Modification of the quantity of carbonic acid exhaled.

4. *Circulatory system.*
    - Globular anæmia and serous plethora.
    - Cardiac hypertrophy.
    - Peripheral venous dilatation (varices).
5. *Urinary system.*
    - Diminution of the solid elements of the urine.
    - Frequency of albuminuria and of glycosuria.
    - Frequency of disturbances of micturition.
6. *Cutaneous system.*
    - Pigmentary collections.
7. *Digestive system.*
    - Modifications of the appetite.
    - Vomiting.
    - Retardation of the different nutritive processes; absorption, assimilation, disassimilation, elimination, with different diseases resulting.

B. Positive or fœtal signs (Six).

Two obtained by palpation.

1. Passive movements or abdominal ballottement.
2. Active movements.

Two by auscultation.

3. Fœtal heart sounds (or fœto-funicular souffle).
4. Fœtal movements.

Two by digital examination.

5. Passive movements or vaginal ballottement.
6. Detection of a fœtal part.

I recall that these positive signs to be actually considered as such must unite certain indispensable conditions, which are:

1. *Clearness.*—When our sensations are not sufficiently exact, conclusions should be suspended.

2. Certain peculiarities.

a. For abdominal ballottement.—The tumor which gives the sensation of ballottement must be *intra-uterine.*

b. For the active movement perceived by palpation.—There must be no interposition of intestine between the uterus and the abdominal wall.

c. For the fœtal heart sounds.—There must be no synchronism with the maternal pulse

d. For audition of the fœtal movements.—The woman must be absolutely quiet and contract no muscle of the abdominal wall.

e. For vaginal ballottement.—The tumor affording ballottement must be intra-uterine.

f. For detection of a fœtal part.—The fœtal part explored must exactly recall a region of the child easily appreciated.

With these signs in view let us examine the possibilities of the diagnosis of pregnancy at different periods in its development. I shall especially have in mind normal (physiological) pregnancy, and shall close with some considerations on the difficulties that different pathological states may surround the diagnosis

A. Normal pregnancy.—Pregnancy lasts nine months, which may be divided into three parts, and the diagnosis varies according as we have to consider the first, the second, or the third three months.

First three months.—During this time no positive sign appears and we are then forced to hold to probable signs. Among these there are three especially which should, on account of their relative importance, fix the attention of the obstetrician and which are like a diagnostic tripod at this period, the other signs only constituting adjuvants. These are:

1. The modifications of the breasts (development of the gland, of the tubercles of Montgomery, pigmentation of the areola, presence of colostrum.)
2. The cessation of the menses.
3. The increase in volume and the softening of the uterus.

If we are consulted by a woman: (1) who can afford exact information on the modifications of the breasts; (2) whose menstruation, habitually regular, has been suddenly arrested without appreciable pathological cause, and (3) finally, when palpation permits us to state clearly the increase in size and the softening of the uterus, we can be almost sure of the existence of pregnancy.

The association of these three signs of probability is almost equivalent to a positive sign; I say *almost*, for the existence of pregnancy should never be affirmed before meeting one or more of the positive signs.

The other probable signs may be grouped around the preceding three and by their number and clearness may diminish the chances of error. But one, or even two, of these three probable signs may be more or less absent, obscuring the diagnosis. On the other hand, each of these three signs may be the consequence of pathological states clearly distinct from pregnancy. I shall only mention these different causes of error, not having space for a complete differential diagnosis.

1. *Modifications of the breasts* (*development of the gland, presence of the colostrum, and pigmentation and development of Montgomery's tubercles*).—The last two signs are of a very different appreciation. It is necessary to have known the areolæ, and to have preserved an exact memory to appreciate the changes. Simple extemporaneous observation cannot be sufficient, except in rare instances.

The augmentation of volume is also produced under the influence of adipose deposit, in cases where the simultaneous development of the abdomen may also lead to a supposition of pregnancy.

With regard to the presence of colostrum, it has actual importance only in the primiparæ, for in women who have had children, and especially those who have nursed children, there may be, for a long time after weaning and in particular at the menstrual period, some drops of colostrum in the nipple. In the primiparæ this sign becomes of influence in the diagnosis of possible pregnancy, but it is necessary to guard against making it a positive sign, for colostrum is sometimes met after prolonged genital excitations or in consequence of some uterine affections, even in virgins.

2. *Cessation of the menses.*—The different causes of amenorrhœa, including pregnancy, may be arranged as follows:

A. Extra-genital causes.

1. GENERAL DISEASES.
    - *a. Acute.*—Typhoid fever, etc., causing a simple passing amenorrhœa.
    - *b. Chronic.*—Chlorosis; phthisis; poisoning; anæmia, from deprivation or unsanitary surrounding. In fact, any debilitating cause may produce amenorrhœa.
2. LOCALIZED DISEASES.
    - *a. Acute.*—Any acute disease is capable of causing a momentary amenorrhœa. A sudden impression, an emotion, the action of cold, an indigestion, the use of exciting drinks, certain medicaments (opium), bleeding, act the same.
    - *b. Chronic.*—Prolonged suppuration, etc. Any cause of debilitation. Intestinal worms, by reflex reaction, cause amenorrhœa.

B. Genital causes.

1. GENITAL DISEASES.
    All diseases of the uterus and of the contiguous organs are capable, to different degrees, of causing a more or less prolonged amenorrhœa. Excess of coition or the first coition, may act in the same way.
2. PHYSIOLOGICAL CAUSES.
    Pregnancy, lactation, menopause.
3. GENITAL MALFORMATION.
    Absence or atrophy of the ovaries or of the uterus.
4. GENITAL MUTILATIONS.
    Ablation of the ovaries or of the uterus.
    Cicatricial occlusion of the genital canal.

3. *Augmentation of the volume of the uterus.*—The different causes capable of producing an increase in the volume of the uterus are:

I. Principal causes that may simulate an increase in the size of the uterus and that may produce errors:
  a.—Ovaries: cysts, cancer.
  b.—Broad ligaments: cysts, phlegmon, salpingitis.
  c.—Rectum: cancer.
  d.—Bladder: retention of urine, cancer.
  e.—Peritonæum: pelvic peritonitis, extra-uterine pregnancy, hæmatocele.
  f.—Pelvis: osteo-sarcoma.
  g.—Tympanites, adipose, ascites, and all abdominal tumors causing an increase in the size of the abdomen.

II. Cause of augmentation in the volume of the uterus:
  a.—Menstrual congestion.
  b.—Metritis.
  c.—Simple hypertrophy.
  d.—Hæmatometra, physometra.
  e.—Mucous, fibroid, or papillary polypi.
  f.—Hydatid or dermoid cysts.
  g.—Fibroids (very frequent).
  h.—Sarcoma (very rare).
  i.—Cancer.
  j.—Normal or pathological pregnancy.

Second three months.—The first part of pregnancy is characterized by the absence of the positive signs and the last by their presence. In the second three months, intermediate between these two periods, these signs appear:

Sometimes, and rarely, at the beginning (fourth month).
Sometimes, and generally, in the middle of this period (fifth month).
Sometimes, exceptionally late, toward its termination (sixth month).

Now, before the appearance of these positive signs the diagnosis presents under the same condition as in the first three months and we may relate it to the explanations given above. After their appearance the diagnosis is much simplified and will be established as in the third and last three months which we now study.

Third three months.—The existence of the positive signs generally renders diagnosis easy during this period. These signs are, as given:

Palpation.	1. Abdominal ballottement.
	2. Active movements of the fœtus.
Auscultation.	3. Fœtal heart sounds.
	4. Active movements of the fœtus.

Digital examination. 5. Vaginal ballottement.
6. Detection of a fœtal part.

It will be remarked that among these signs, there are three which simply indicate the presence of the fœtus, and three which permit us to say that it is living. These are:

a. Signs of the presence of the fœtus.
  1. Abdominal ballottement.
  2. Vaginal ballottement.
  3. Detection of a fœtal part.

b. Signs of the life of the fœtus.
  1. Palpation of active movements.
  2. Audition of fœtal heart sounds.
  3. Audition of active movements.

These signs have already been studied in detail and I shall not return to them.

B. Pathological pregnancy.—Numerous pathological states may complicate pregnancy and obscure its diagnosis. They will be studied in that part which is reserved for puerperal pathology. I shall simply enumerate the principal conditions. These different complications are, passing from the periphery of the uterus toward the fœtus:

1. *The various abdominal tumors;* cysts of the ovary, hydronephrosis, ascites, and extra-uterine pregnancy.
2. *Malformations of the uterus;* double uterus.
3. *Diseases of the ovuline appendages;* hydatiform moles, hydramnios.
4. *Death of the fœtus, multiple pregnancy (2 to 5), monstrosities.*
5. Finally, the persistence of the menses during pregnancy.

To complete this chapter there remain to be spoken of, the *age* of the pregnancy, that is, the probable date of delivery (discussed under the duration of pregnancy), the volume of the fœtus and its situation in the uterus, and finally, the question relative to the probable sex of the child, so often asked of the accoucheur.

Ahlfeld has attempted measurements to determine the dimensions of the fœtus, but his results are of little practical value. To appreciate the volume of the child the obstetrician is reduced to an approximate estimation based on the knowledge derived from palpation.

We have seen the mode of determining the situation of the fœtus during pregnancy, by palpation, auscultation and digital examination, and it is useless to review this subject.

With regard to the diagnosis of the sex of the child, a question nearly allied to that of procreation of the sexes at will, we are no more advanced than in the time of Mauriceau, who thus expressed himself on this subject: "We can have no positive knowledge of the sex of the child which is in its mother's abdomen, and no knowledge of the means of begetting a boy rather than a girl."

CHAPTER VIII.

PROGRESS AND DURATION OF PREGNANCY. PROGNOSIS.—HYGIENE.

A. Progress. — During the first three months the uterus, although but little developed, is the source of painful disturbances explained by reflex action—nausea and vomiting and the syncope. During the second three months these disturbances usually disappear. In the last three months the uterus becomes voluminous and attains the upper portion of the abdominal cavity, interrupting the action of the stomach and especially of the diaphragm. Below, it slowly invades the pelvis, disturbing the functions of the rectum and bladder. Finally, its size opposes the free circulation of the pelvis and lower limbs.

B Duration.—To appreciate the average duration of pregnancy, it is necessary to know exactly the moment of conception, that is, of the meeting of the male and female elements—spermatozoid and ovule. Unfortunately, our ignorance on this point is complete. In the most favorable circumstances, where there has been a single sexual connection affording exact information as to the moment when the spermatic fluid was deposited in the female genital organs, we are still at a loss as to the epoch of conception, for the spermatozoids, according to Schroeder, may preserve their fecundating properties for fifteen days (perhaps more) before meeting the ovule. These fifteen days make exact calculation impossible.

This vagueness enveloping the moment of conception naturally reacts on the fixation of the duration of pregnancy. How shall we decide on the duration of a state when we are ignorant as to its commencement? To discuss the length of pregnancy and to attempt to fix it within one or two days is to take a perfectly useless trouble.

However, it seems that we can admit, as an approximate and a provisory figure, nine solar months, or two hundred and seventy-five days. By leaving a contingent ten days, five before and five after, we have the probable duration of pregnancy oscillating between two hundred and seventy and two hundred and eighty days. These figures, I repeat, only indicate the probabilities. Thus in presence of this uncertainty we are justly astonished to see authors dilate at great length on the study of *prolonged pregnancies*. This idea of prolonged pregnancy has taken its source from various categories of observations:

The *first* comprised the cases where the duration between the last menstruation and delivery has been greater than the usual time. I can cite a case where this duration was three hundred and thirty-five days, and cases of this kind are far from being rare. But in such cases it is wrong to suppose conception near the end of the last menstruation, since this can not be proven, and the negative can be supposed as well as the affirmative.

The same is true of the second category of facts, where pregnancy has been the consequence of a single coitus, or of sexual relations taking place within a short interval of time. The possibility of a contingent fifteen days, during which the spermatozoids may live in the female genitalia makes cases of prolonged pregnancy, founded on this class of facts, still contestable.

A third category of facts comprehends those where the volume of the fœtus is greater than the average, and corresponds to a prolonged duration between the last menstruation, or a single coition and delivery. But as we have seen women delivered at the usual time of pregnancy of a very large fœtus (4000 grammes and more), we can suppose from this that in the other case the duration of pregnancy has been normal.

Finally, in a fourth class, we shall rank those furnished by veterinary obstetrics. But in all these observations the prolongation of pregnancy remains doubtful, on account of the impossibility of determining the exact date of conception. There is nothing, then, permitting the affirmation of prolonged pregnancy, but it must also be added that there is no proof that obliges us to deny its possibility.

It is not sufficient to know the approximate duration of pregnancy, it is equally necessary to be able to predict the probable date of delivery. This determination will be based on the following signs:

1. *Signs furnished by interrogation.*
    - *a.* Signs of the commencement:
        1. Last menstruation.
        2. Single coition.
        3. Appearance of sympathetic phenomena.
    - *b.* Sign in the middle period:
        4. First movements of the fœtus.
    - *c.* Sign toward the end:
        5. Phenomena of descent of the uterus.

2. *Signs furnished by direct examination.*
    6. Volume of the uterus and of the fœtus.
    7. Engagement of the fœtal part.
    8. Modifications of the cervix.

1. *Last menstruation.*—The time which most often separates the last menstruation from delivery is two hundred and seventy-five to two hundred and eighty-two days, with a minimum of two hundred and forty-six days and a maximum of three hundred and twenty-eight days.

2. *Single coitus.*—Delivery generally takes place at the end of two hundred and seventy-five days, that is, nine months after the fecundating coitus, with a possible deviation between two hundred and forty-two to three hundred and seventeen days. The special sensations felt by some women can only exceptionally be taken into consideration.

3. *Appearance of sympathetic phenomena.*—It is rare that these phenomena (vomiting, syncope, development of varices, etc.) indicate the exact beginning of pregnancy, for in most cases they only appear some time after conception. However, some women, taught by a previous pregnancy, can sometimes recognize the beginning of pregnancy in this way.

4. *First movements of the fœtus.*—The first movements of the fœtus are most often perceived in the course of the fifth month. Rarely they occur before this, but they have been observed in the course of the fourth month. It is equally rare for them to appear for the first time during the last four months. Exceptionally women feel no fœtal movements all through gestation although the fœtus is perfectly healthy. Few women can state exactly the precise date of the first fœtal movements. When this moment is known, we shall be right in supposing that delivery will take place in about four months and a half, but this diagnostic point is very variable, for there may be a deviation of a month and even more.

5. *Phenomena of descent.*—In the majority of cases the descent of the uterus appears nul, or we cannot determine it from the information furnished by the woman. The phenomenon of descent in the multiparæ, when it exists, indicates that pregnancy is within the last fifteen days of its termination, but this is only simple probability. In the primiparous woman its importance is nul.

6. *Volume of the uterus and fœtus.*—The volume of the uterus during pregnancy is too difficult to appreciate exactly, so that it yields scarcely any information as to the date of delivery. The height of the uterus in relation to the abdominal wall, however, in spite of the error to which it is exposed, furnishes valuable indices.

In the relation we have:

Fourth month.—Fundus of the uterus a little below the umbilicus.

Fifth month.—At the level of the umbilicus.
Sixth month.—Fundus a little above the umbilicus.
Seventh month.—Three fingers' breadth above the umbilicus.
Eighth month.—Six fingers' breadth above the umbilicus.
Ninth month.—Nine fingers' breadth above the umbilicus.

7. *Engagement of the fœtal part.*—Though the information furnished by the engagement of the fœtus is quite vague, we can suppose, however, that in a primipara, with a deep engagement, delivery will occur in about a month, and in a multipara, with a deep engagement, delivery will not be later than fifteen days. But these figures are approximate.

8. *Modifications of the cervix.*—On the supposition that the cervix is effaced during the latter part of pregnancy, we would have the right to diagnosticate the date of delivery from the length of the cervical part of the uterus. But as, save in exception, it is known to-day that effacement often occurs during labor, such reasoning cannot be admitted.

With regard to the softening of the cervix, it is too variable in its progress, especially in multiparæ, to constitute a important element of diagnosis.

C. Prognosis.—"We can say, without exaggeration," writes Sacombe,* "from experience and observation, that pregnancy far from being a disease is, if I may express myself, a certificate of life for nine months that nature gives to the pregnant woman." To-day we believe, on the contrary, that the prognosis of the majority of diseases is aggravated by pregnancy. We shall see later, apropos of puerperal pathology, the influence of the different pathological states on pregnancy.

With regard to the prognosis of the gestation itself, and especially of delivery, it depends upon divers circumstances, among which must be cited:

1. The conformation of the pelvis.
2. The situation of the fœtus (presentation and position).
3. The composition of the urine (albuminuria).

From these comes the extreme importance of exact inquiry on these three points during the course of pregnancy.

D. Hygiene of pregnancy.—1. *Digestive system.*—Except in serious digestive disturbances, alimentation should not be modified during pregnancy. Women, usually constipated, are more so during pregnancy and need laxatives or enemas to avoid intestinal accumulation and violent efforts of defecation. Slight purgatives are without objection but drastic remedies should be avoided. If diarrhœa occurs it should be combatted by the usual means.

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* Elements de la Science of Accouchements, 1801, p. 93.

2. *Breasts.*—The clothes should not compress the mammary glands, so as to allow their physiological development. Apropos of lactation we shall see the special care to be given the nipples, which demand preparation, a veritable education in view of this physiological function.

3. *Sexual relations.*—The physician is often consulted for advice as to the continuance of sexual relations during pregnancy. In cases of irritable uterus and in women predisposed to abortion, all sexual relations should be interdicted during pregnancy, especially at a time corresponding to menstruation. It will even be wise to prescribe separate beds for the husband and wife, the vicinity of the husband often causing a genital excitement that is unfavorable to the calm required by the uterus for its normal development.

4. *Medicaments and operations.*—Any drug given in a tonic dose is capable of producing abortion. Remedies prescribed during pregnancy, then, should be given in relatively small doses. There are some exceptions, however, for example, mercury in syphilis, and sulphate of quinine in malaria, where an energetic action is necessary.

Can a pregnant woman undergo, without inconvenience, a surgical operation? This question should be viewed from two standpoints:

1. Does pregnancy interfere with the consequences of an operation? The answer is negative for the majority of cases. Gestation does not appear to interrupt cicatrization nor predispose to complications.

2. May the operation interrupt the course of pregnancy? Every operation exposes to abortion, and this danger increases as the genital zone is approached. But very often intervention interesting the uterus itself (amputation of the cervix, ablation of fibroids developed in the uterine wall) have not been followed by any unfortunate result. Besides the danger of abortion is not in relation with the gravity of the operation, as some women continue their gestation in spite of an ovariotomy, while others abort after the extraction of a tooth. In the presence of this variability of results it is prudent to perform during pregnancy only operations of necessity.

3. *Professions.*—Certain professions are unfavorable to the normal evolution of pregnancy. Some are exposed to poisoning, such as workers in lead, caoutchouc (sulphide of carbon), tobacco, others to excessive fatigue, as laundresses, shop girls, sewing-machine operators, etc.

4. *Clothing.*—All tight clothing should be proscribed. The corset should be as loose as possible. In women predisposed to varices or œdema of the lower limbs the garters should be replaced by suspending the stockings by bands attached to the corset. The use of improper shoes should be avoided. In nulliparous women the relaxation

of the abdomen may be greatly relieved by the use of a hypogastric belt on condition that it is large and embraces the lower two-thirds of the abdomen.

5. *Exercise and voyages.*—Some women, naturally indolent, profit in their pregnant state by confining themselves to an exaggerated repose. This practice is deplorable, daily exercise is necessary. On the contrary we must restrain the imprudent who, in spite of their condition, continue their former habits, going to balls, theatres, etc. Carriage riding is generally favorable. It is wise to dissuade from horsemanship. According to Irwin, sea voyages predispose to menorrhagias, while Kugelman states that railway journeys produce delay of the menses. This would be an interesting difference if clearly established. However, in the majority of cases normal pregnancy is not interrupted by these factors, even prolonged. But in women disposed to abortion prudence should be advised.

6. *Toilet.*—Women often inquire if they can continue the use of cold water for their ablutions, the same as before pregnancy. With regard to this no change of habit is necessary. Hot foot-baths should be avoided. Sea bathing is not objectionable, but fatigue should be avoided. Hot baths are favorable, on condition of being short (not over a quarter hour) and being taken at 30° to 35° C.

The vulvar toilet is hygienic, but vaginal injections should be proscribed before the last fifteen days of pregnancy. These injections may be necessary, however, in some cases, where there exists a vaginitis, for example. During the last fifteen days it is well, in an antiseptic point of view, to advise a daily injection of a bichloride of mercury solution (1–4000).

CHAPTER IX.

ACCOUCHEMENT.—MATERNAL PHENOMENA.

Accouchement is the expulsion of the ovum from the maternal organism, whether the ovum be in the uterus, as in the normal state, or outside it, as in extra-uterine pregnancy. According to the period at which this takes place accouchement receives various denominations:

1. During the first six months—abortion.
2. During the last three months—premature accouchement.
3. At normal term—accouchement at term.
4. After normal term—delayed accouchement.

Accouchement is generally made in two stages:

First stage, expulsion of the fœtus.
Second stage, expulsion of the appendages.

There are then two successive deliveries:

1. Fœtal expulsion or accouchement properly so-called.
2. Accouchement of the annexes or delivery.

Fœtal accouchement.—The term accouchement employed alone will be applied exclusively to the fœtal expulsion, as opposed to delivery, that will be reserved to designate the expulsion of the appendages.

Labor is almost synonymous with accouchement; however, this word applies more particularly to the modifications of the genital organs which prepare for the expulsion (uterine contraction, opening of the parturient canal, etc.).

Considered according to its difficulties accouchment is called:

1. *Normal, physiological, entocic,* when the fœtus presents by the vertex and when no difficulties arise.

2. *Abnormal, pathological, dystocic,* in contrary conditions.

Or again:

1. *Spontaneous,* when it is left to the forces of nature alone.

2. *Artificial,* if intervention is necessary. However, a slight intervention, for example that which consists in aiding the rotation of the head with the finger, is not considered as constituting an artificial accouchement. Besides, these limits are arbitrary.

Maternal phenomena.—The contraction of the uterus and its accessory, that of the abdominal wall, causes the successive opening of the cervix, of the vagina, and of the vulva. Contraction is then the cause and the opening the effect. We shall study these two phenomena; one etiological, the other the result.

A. *Uterine contractions.*—The uterine contraction presents three essential characteristics, it is painful, intermittent and involuntary.

Painful.—The pain is the dominant character of the uterine contraction to such an extent that, in common language, these two words are taken (wrongly) as synonyms. It establishes the difference between the uterine contractions of pregnancy and those of labor. The woman suffers only at the moment when labor commences.

Its *intensity* is quite variable. Some women are delivered without a trace of pain. Others suffer so dreadfully that they prefer to die and even seek death.

The character of the pains varies according to the period of labor.

a. Period of dilatation of the cervix.

1. *Initial pains.*—Slight pains in the hypogastrium, in the flanks and especially in the lumbar region.

2. *Preparatory pains.*—Sharper than the preceding; occupying the same situation and sometimes radiating along the thighs, in the track of the crural nerve.

b. Period of expulsion.

1. *Expulsive pains.*—The pain takes a new character, because the woman at each contraction feels the need of bearing down. Each pain is accompanied then by a more or less energetic effort in this direction. The radiations along the lower limbs are still frequent but occupy by preference the course of the sciatic.

2. *Conquassant pains.*—These are the terminal expulsive pains, of accrued intensity, from the excessive dilatation of the vulva at the moment of the passage of the fœtal head.

The *cause* of the pain during uterine contractions has been the subject of long discussions. But it is known that the pathological or energetic contraction of every organ provided with smooth muscular fibres produces a pain designated as colic. Now, the pains of accouchement are only uterine colic. All the uterus is painful during uterine contraction, thus, at this moment compression of the abdomen and palpation are painful to the woman. Digital examination is equally painful when the finger drags on the external orifice of the uterus. Generally the pain disappears in the interval of the contractions. However, when the contractions are very frequent or very energetic, as at the end of labor, it is not rare to see them almost continuous, with exacerbation at the moment of muscular activity.

In the early part of labor, during the initial contractions, the patient, who is walking to and fro, stops, supports herself on a chair and inclines forward. She becomes quiet, the face contracts, some oscillations show the mute suffering, then the calm returns and the patient is momentarily free. Later the pains, becoming more intense, elicit cries, clamorous complaints, mixed with words of despair. These cries are more and more marked as dilatation progresses.

During expulsion efforts complicating the situation modify the nature of the cries and permit a practiced ear to easily recognize this last period of labor.

Intermittent.—

Initial pains, repeated every twenty minutes, duration thirty seconds.*

Preparatory pains, repeated every ten minutes, duration sixty seconds.

Expulsive pains, repeated every five minutes, duration ninety seconds.

Conquassant, almost continuous.

The intermittent character of the contractions permit repose for the uterus and the re-establishment of the fœtal circulation, which is more or less disturbed during uterine systole. A prolonged contraction, that is, uterine tetanus, causes death of the fœtus by the arrest of its circulation.

Involuntary.—As in all the unstriated muscular structures, the contractions of the uterus are independent of the will. However, some conditions are capable of reflex action, of modifying the intensity or the frequence of the contractions. Thus they are seen to diminish under the influence of an emotion or in the presence of a person disagreeable to the patient.

In opposition to the uterine contractions, those of the abdominal walls are essentially voluntary, and some women can retard or advance delivery by regulating their intensity.

Some words on the results of uterine contraction. The uterus by contracting diminishes the vertical and antero-posterior. We have seen the influence of the contraction on the fœtal circulation. The number of maternal pulsations is, on the contrary, increased throughout its duration (Fig. 197). When the bag of waters is ruptured, there is a slight flow of the liquor amnii at the beginning and the end of the contraction. The force of the uterine contraction varies from one to twenty kilogrammes, and can be fixed at an average of ten kilogrammes. The assistance of the abdominal contraction is capable of increasing this force to three and even to four times the power (thirty to forty kilogrammes).

B. *Abdominal contractions.*—The contraction of the abdominal muscles, that is, the expulsive effort, follows at an advanced period of labor, usually when the dilatation of the uterine orifice is complete and when the fœtal part is supported on the perinæum. It commences a little after the beginning of the uterine contraction and ceases a little before its termination. The expulsive effort is not always single during a uterine contraction, three, four or five efforts may be observed. The abdominal contraction depends upon the will, but the need of bearing down is so imperiously impressed on the woman that she cannot restrain from it. The expulsive effort may exist without uterine contraction, and take place sometimes under the direction of the accoucheur to terminate a very much advanced expulsion.

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* These figures only represent the average, they are subject to great variation.

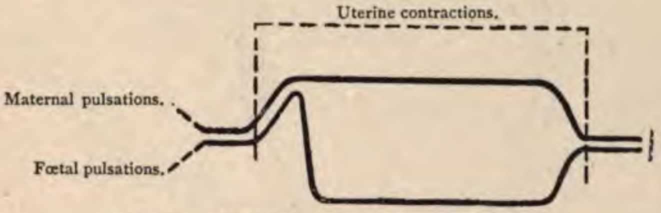


FIG. 197.—Influence of uterine contraction on the fœtal and maternal pulsations.

C. *Vaginal contractions.*—The vagina, endowed with an unstriated muscular coat, is contractile, but the contractions of this canal are so feeble that their role seems almost nul in accouchement and very rudimentary in delivery itself.

II. *Opening of the cervix, of the vagina and of the vulva.*—The two canals which must successively open and allow the passage of the fœtus are:

The cervix uteri, to which must be added the inferior segment of the uterus.

The vagina, terminated by the vulva and sustained by the perinæum.

Let us study these two successive openings:

A. *Dilatation of the cervix.*—At term, the uterus is constricted by three parts (Fig. 198). An upper thick part, called the superior segment of the uterus (divided by some authors into median and superior segments). A thin intermediate portion, separated from the preceding by the uterine circle (or Bandl's ring). This is the inferior segment of the uterus. An inferior portion is comprised between the external and the internal orifice constitutes the cervix.

The superior segment is formed by the body of the uterus, the cervix remains as it was before pregnancy, but with regard to the origin of the inferior segment there are three theories. The first, that of Brandl and Braune, attribute its formation exclusively to the cervix. The uterine circle would be the internal orifice and the effacement of the cervix would constitute the inferior segment. The second theory is also from Bandl, who, modifying his first views admits that the inferior segment is formed in part by the cervix and in part by the body of the uterus. Finally, Waldeyer and Hofmeier have sustained a third theory, according to which the inferior segment is formed exclusively by the body of the uterus.

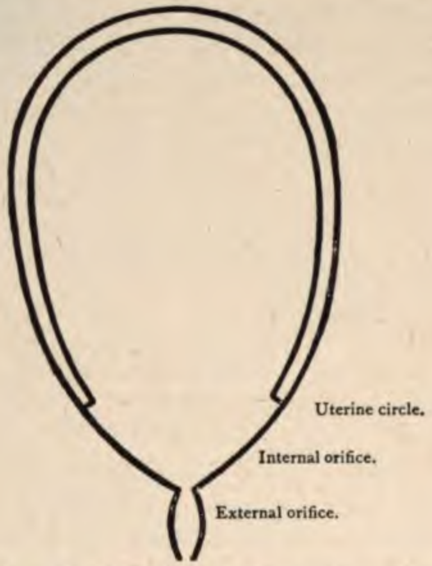


FIG. 198.—Uterus at the beginning of accouchement.

I believe it can be demonstrated that no one of these explanations is satisfactory. The uterus in the normal state and before conception is composed, in fact, of three parts: The body; the isthmus; the cervix. Now, at the end of pregnancy, the body constitutes the superior segment of the uterus. The isthmus, the inferior segment. The cervix remains intact. The schemas 199, 200 and 201 present a *resume* of my idea.

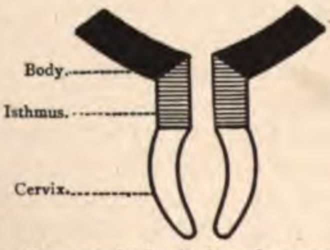


FIG. 199.—Uterus at the beginning of pregnancy. The inferior segment is at this period of pregnancy formed by the body.

Thus understanding the inferior segment and the cervix, we may study the effect of the uterine contractions in dilating these parts for the passage of the fœtus. Let us suppose a section of the inferior part of the gravid uterus (Figs. 202 to 208).

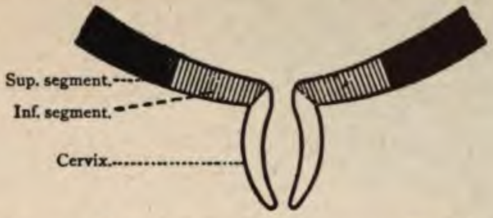


FIG. 200.—Uterus at the end of pregnancy. The inferior segment is formed by the isthmus.

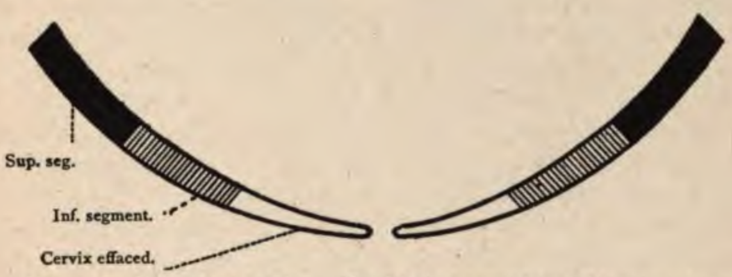
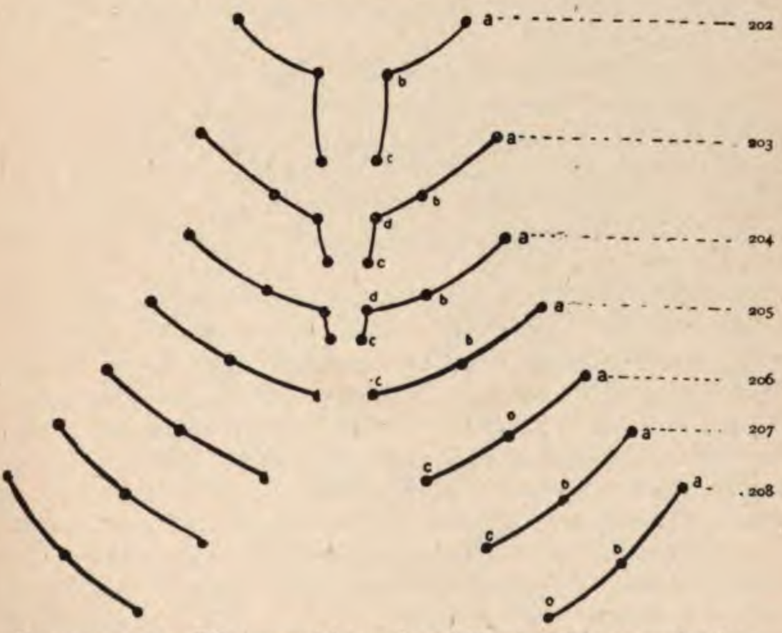


FIG. 201.—Uterus during labor. The inferior segment is at this moment (labor) formed by the isthmus and cervix.



FIGS. 202 to 208.—Effacement of the cervix and dilatation of the external orifice. (Fig. 202, cervix not effaced; Fig. 203, cervix being effaced; Fig. 204, cervix being effaced; Fig. 205, cervix effaced; Fig. 206, dilatation of external orifice; Fig. 207, dilatation of external orifice; Fig. 208, dilatation of external orifice.)

The point *a* is the section of the uterine circle.

The point *b* is the section of the internal orifice.

The point *c* is the section of the external orifice.

The line *ab* represents the wall of the inferior segment.

The line *cb* represents the wall of the cervix.

The point *d* marks the section of an orifice of new formation (Muller's orifice).

Now the opening as in figures 202 to 205 is called effacement. While that occurring in figures 205 to 208 is called dilatation (of the external orifice). Effacement, then, is the disappearance of the cervix, its fusion with the body of the uterus, or better, the fusion of the cavity of the cervix with that of the body of the uterus. Dilatation is the opening of a simple diaphragm, which, after effacement, separates the uterine cavity from the vaginal cavity. But there is no advantage in thus limiting the word dilatation, and it is better to apply it also to the opening of the internal orifice and to the cervical cavity as well as to that of the external orifice. When there have been indicated the length of the cervix (that is, the degree of effacement), the degree of dilatation of the external orifice, of the cervical cavity (if it exist) and of the internal orifice (if still remaining), the explanation is sufficiently clear.

When it opens progressively under the influence of the internal contraction, the external orifice is:

Sometimes circular.
Sometimes oval.
Sometimes irregular (cicatrices—cancer).

The *thickness* of the cervix varies according to the parity: In the primipara there is a marked thinning; the edge of the orifice gives a sensation analogous to that felt in touching the frænum of the tongue. In the multipara, on the contrary, the contour of the cervix is thick, analogous to the lips slightly drawn over the teeth by their intrinsic muscles.

The rapidity of the dilatation of the external orifice varies with parity (about ten hours in the primipara, five hours in the multipara), with the vigor of the uterine contraction, with the state of the softening of the cervix, with the presentation, with the state of the pelvis, etc. It progresses more rapidly in proportion as it advances. Its progression is generally regular; however, it is not rare to observe an arrest during a half hour, an hour, or even more. This interruption may be renewed several times. Sometimes the external orifice after dilatation to the extent of two to three finger's breadth may even reform. The pregnancy resumes its normal course to a reappearance of labor after a variable time. This has been designated as retrocession of labor.

During dilatation of the external orifice various complications may occur. Among these I shall mention œdema and lacerations.

Œdema is sometimes generalized around the cervix, as often observed in some cases of prolonged labor. In the multipara it invades and thickens the free border of the orifice (Fig. 209). In the primipara it respects the free border, which preserves its characteristic thinness (Fig. 210). Sometimes it is localized to a portion of the cervix, almost always to the anterior lip, as observed by preference in the occipito-posterior positions on account of the compression exercised by the forehead against the pubes.

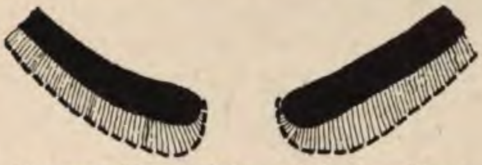


FIG. 209.—Œdema of the cervix in the multipara.

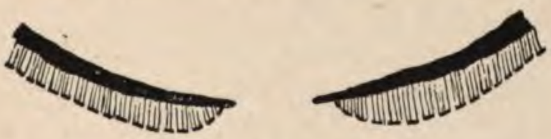


FIG. 210.—Œdema of the cervix in the primipara.

Lacerations.—The fœtal part pushed too violently by the utero-abdominal contraction, sometimes produces true tears which are shown (Fig. 211):

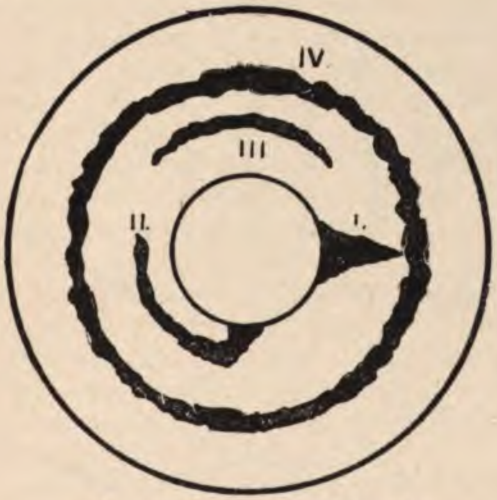


FIG 211.—Lacerations of the cervix.

I. Sometimes as a simple slit, most frequently to the left, on account of the most frequent situation of the occiput to this side.

II. Sometimes as a strip; the path of this laceration leaves the orifice and curves parallel to the periphery of the cervix.

III. Sometimes as a button-hole, without affecting external os.

IV. Sometimes as a circular button-hole, which detaches all the inferior portion of the cervix, separating it and leaving it as though set in a socket.

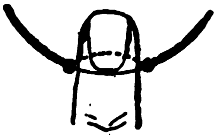


FIG. 212.
Dilatation of one finger's breadth.

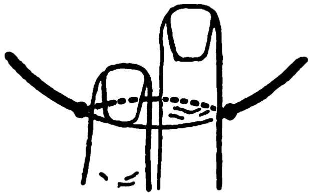


FIG. 213.
Dilatation of two finger's breadth.

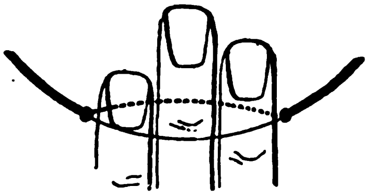


FIG. 214.
Dilatation of three finger's breadth.

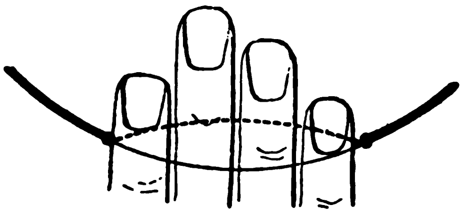


FIG. 215.
Dilatation of four finger's breadth.

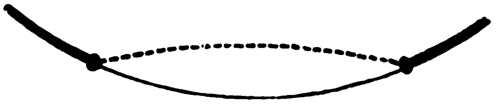


FIG. 216.
Dilatation of five finger's breadth or palm of the hand.

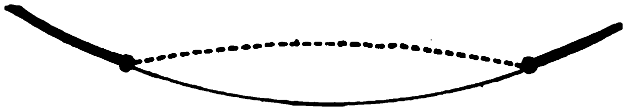


FIG. 217.
Dilatation of six finger's breadth or complete.

FIG. 218.—Perinæal ampliation during accouchement.

The degree of dilatation of the external cervix is estimated by the sense of touch. The older authors expressed the degrees of dilatation in comparison with the size of various pieces of money, then with that of the palm of the hand and finally as complete. Some modern authors, particularly Budin, have proposed estimation in centimetres. But pieces of money vary in different countries and the metric system has not been universally adopted so that it is preferable to estimate the degrees of dilatation in finger breadths (Figs. 212–217).

Dilatation is called complete when the periphery of the external orifice is in contact with the pelvic ring. It is called sufficient when it permits the passage of the fœtus. This last condition is relative to the volume of the child. In the diagnosis of the degree of dilatation, it is necessary to keep in mind some causes of error. These are: A circular vaginal fold. Folds of the scalp. Large bag of water. Thinning of the cervico-uterine segment. Deviation of the uterine orifice. It is sufficient to know these, to be able to avoid error.

B. *Opening of the vagina and vulva.*—The vagina, of which the vulva may be considered the external orifice, opposes by itself only a feeble resistence to the progression of the fœtal part. The hymen alone, in some primiparæ, is capable of causing an obstacle of some importance. But the vagina lies on the perinæum, which, especially in the primiparæ, opposes a serious resistance to the exit of the fœtus. From this arises the necessity, for the vagina as for the cervix, of a veritable labor before permitting accouchement. For the description of the vagino-vulvar dilatation, I shall suppose a presentation of the vertex, the most common. The uterus contracts and aided by bearing-down it pushes the cephalic extremity into the vaginal canal, which has a direction perpendicular to the uterine axis. In this way the fœtal head, forced parallel to the uterine axis, tends to gouge into the perinæum (Fig. 218). The perinæum, essentially contractile and retractile, reacts against this pushing from the uterus, and the effect of these two forces combined is to direct the fœtal part toward the vulvar orifice.

The perinæum constitutes a sort of door, swinging one way, *flexible*, with the sacro-coccygeal articulation representing the hinge, and the inferior part of the vulvar orifice the free side. This door opens under the fœtal pressure, first in its posterior part, or coccy-anal, then in its anterier part, or ano-vulvar.

1. *Coccy-anal ampliation.*—The head presses first on the coccyx, which it pushes backward. But the coccyx, solidly maintained on each side by the fibers of the perinæal levator, opposes a serious obstacle to the passage of the head.

2. *Ano-vulvar ampliation.*—The progression continues. The anus opens by degrees (Fig. 219). The head at this moment appears at the vulva then retreats in the interval between the contractions. At each new effort the head advances a little more and dilates the

vulvo-vaginal orifice. Finally, by a swinging movement the head issues distending the perinæum to the maximum and dragging it forward. As soon as the most voluminous part of the fœtal region has passed, the perinæum, which has been drawn out, retreats uncovering the fœtal part. The first part of accouchement is completed, one of the ovoids has made its exit and the other escapes by an analogous mechanism. The perinæal opening has been dilated by the first ovoid, so that the passage of the second is made with a relative facility.

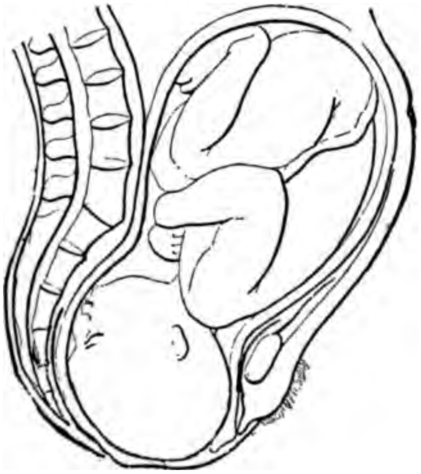


FIG. 218.—Perinæal ampliation during accouchement.

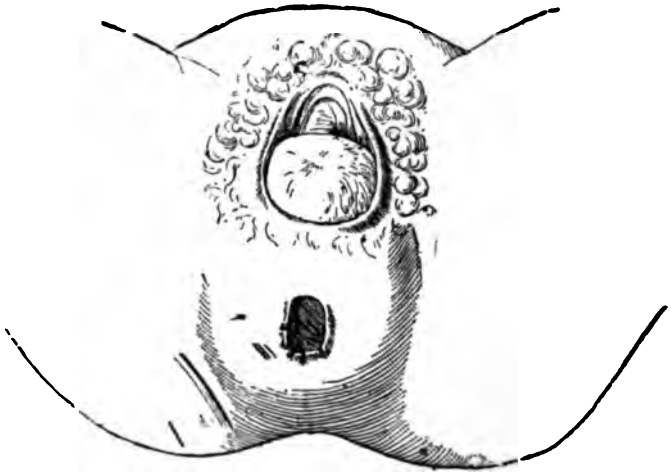


FIG. 219.—Perineo-vulvar ampliation. Opening of the anus.

During this ampliation the perinæum undergoes an enormous transverse distention, and especially antero-posterior, so that the distance which extends from the inferior extremity of the sacrum to the fourchette approximately arrives at twenty centimetres, four for the anus and about eight for the retro-anal (comprising the coccyx) part and eight for the ante-anal part. Even this distance may be exceeded.

One of the most frequent complications of accouchement is constituted by wounds of the vulva and of the perinæum. We might say these wounds are the rule, for out of one hundred cases I only found the vulva intact in five. Leaving to one side the ecchymoses, which compose the first degree of vulvar traumatisms, we can divide wounds of this region into three categories:

1. Those which affect the inferior or posterior part of the vulva.
2. Those which occupy the latero-posterior regions.
3. Finally, the complex wounds—mixed wounds combining the two preceding.

1. *Inferior and posterior wounds.*—Wounds of the inferior or posterior part of the vulva are those which are usually designated as lacerations of the perinæum. They may be marginal ( ) or central (Fig. 221).

a. Marginal lacerations. Lacerations which take place at the moment of accouchement are usually produced in the following manner: The fœtal part, upon reaching the outlet of the vagina, the vulvar orifice, nicks the posterior edge of this orifice; the cut, extending through the different tissues, successively invades the navicular fossa, the fourchette, the perinæum, from above downward, the anus, and finally, in exceptionally severe cases, the recto-vaginal membrane. According to the extent of the tear and amount of tissue involved, the lacerations are divided into three degrees:

I. First degree. The posterior navicular commissure (see p. 94) only is torn; the anterior is intact. The navicular fossa is more or less torn. This degree of laceration is so common with primiparæ that some authors consider it normal, wrongfully eliminating laceration of the perinæum.

II. Second degree. The fourchette is wounded, the laceration being more or less extensive in the direction of the anus without including the sphincter: the laceration is regarded as slight, when it is confined to the vicinity of the fourchette, and grave, on the contrary, when it extends to the posterior half of the vulvo-anal space.

III. Third degree. Laceration complete or, more properly, complicated. The anus, and sometimes the rectum, is open and communicates directly with the vagina. A large recto-vaginal breach extends across the perinæum.

b. Central lacerations. Having reached the vulvar orifice, the fœtus, instead of passing through the vulva, makes a veritable cap of the perinæum, which it immeasurably distends: when the limit of its elasticity has been reached the perinæum gives way at its centre and an orifice is formed between the vulva and the anus, through which the fœtus passes, producing more or less considerable disorders (Fig. 221).

We may include here the isolated ruptures which may be found sometimes upon the perineal surface, or upon the posterior wall of vaginal mucous membrane, and which are like the starting point of a central rupture. The interstitial ruptures, those, for example, which give rise to thromboses, belong to the same category.

2. *Latero-superior wounds.*—As in posterior wounds it is necessary to establish here the distinction between marginal and central laceration. The marginal lacerations extend outward from the vulvo-vaginal orifice or its vicinity, and are directed toward the free border of the labia minora which they may attain (Figs. 222 to 225). The central lacerations produce a veritable perforation of the labia minora, analogous to the central laceration of the perinæum (Fig. 226).

a. Marginal lacerations.

I. First degree. Simple tears or lacerations which affect only the free edges of the inferior labia and which are usually situated on the internal face of the nymphæ.

II. Second degree. The free border of the vulvar ring or external vulvar orifice, free border of the *labia minora* and the *præputium clitoridis* is affected. There is a solution of continuity of the surface.

III. Third degree. Complex lacerations. This variety exists only when the urethral canal is affected, for the rectum and the urethra are the only visceral canals, in the vicinity of the vulva, capable of being damaged. The clitoris is also exposed to being affected in this region.

b. Central lacerations. These are lacerations of the *labia minora* analogous to the central rupture of the perinæum.

3. *Complex wounds.*—Complex wounds are constituted by the association of the two preceding varieties. I shall not return to their description. The number of wounds which may affect the vulva is variable. They may even amount to eight, as I have seen (Fig. 227).

Prognosis.—Vulvar lacerations expose to two important accidents: for one part, to hæmorrhage at the moment of accouchement, especially when an artery, a dilated vein (varices) or a vascular organ like the clitoris, is affected; for the other part, during post-partum, to hæmorrhage. Wounds well cared for reunite, at the perinæum most often by first intention, at the latero-superior part of the vulva, by first intention in some cases, in others, and more often, by second intention.

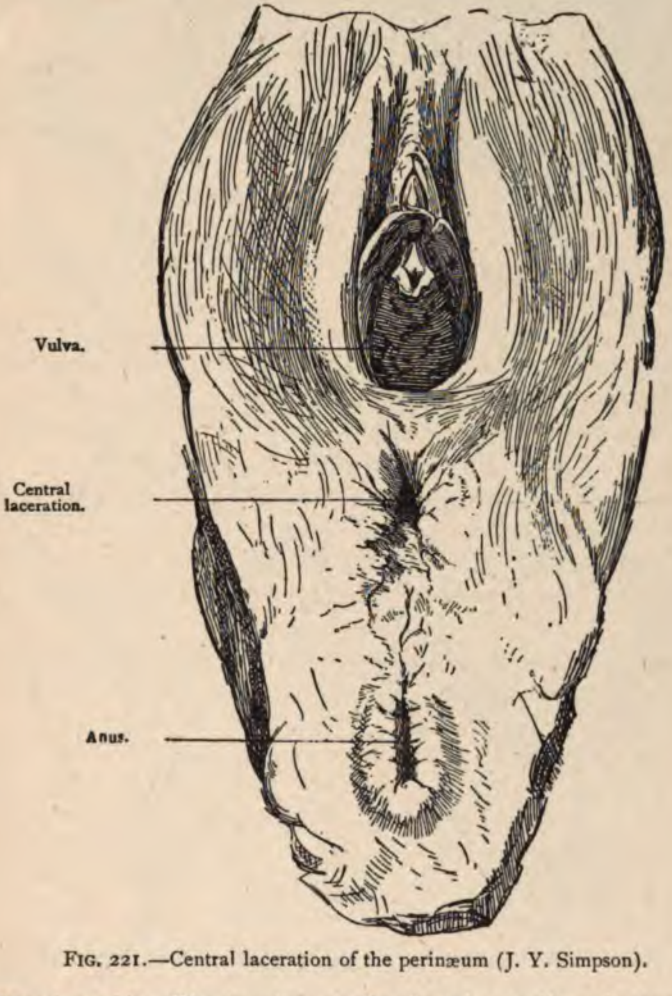


FIG. 221.—Central laceration of the perinæum (J. Y. Simpson).

Treatment.—The treatment of vulvar lacerations is preventive and curative.

A. *Preventive treatment.—1. Perinæo-vulvar dilatation.*—Formerly a series of manœuvres were practiced to hasten the opening of the vulva and of the cervix, but these have been justly abandoned, for

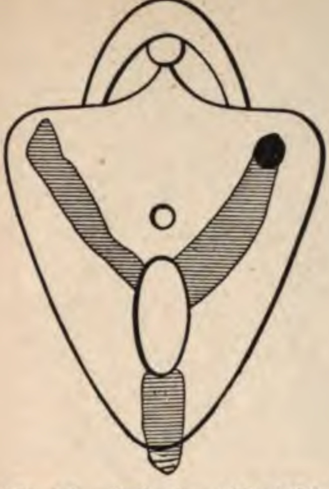


FIG. 226.—Perforation of the left labia minora (black point).

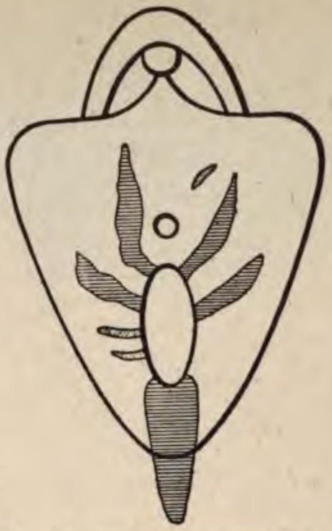


FIG. 227.—Complex wounds of the vulva (8).

In the dorsal position, the buttocks are uplifted by means of a cushion, in such a way as to permit easy inspection of the genital organs. The legs are flexed and the thighs widely separated. The physician placed to the right of the woman, passes the right hand under her right thigh and applies it on the perinæum (Fig. 228), taking care not to cover the fourchette, so that the eye can follow its modifications. The other hand is placed on the fœtal head to maintain it. The fœtal part is thus solidly held by the accoucheur, directly by the upper hand, mediately through the perinæum by the lower one. Its exit is thus regulated at will.

In the lateral position the woman is placed so that the buttocks correspond to the edge of the bed and the thighs are flexed, making almost a right angle with the trunk. The upper thigh should be a little more flexed than the lower and between them will be placed a pillow rolled on itself, or any cushion, to keep the limbs separated. The right hand (Fig. 229) supports the perinæum, as in the dorsal position, the other passed around the upper thigh supports the head.

3. *Episiotomy.*—To avoid extended tears of the perinæum vulvar incisions have been proposed. The different procedures advised are united in the schema of Figure 230.

Ritgen.—A series of radial incisions.

Eichelberg.—One or two large latero-inferior incisions.

Michaelis.—Posterior incision.

Tarnier and Chantreuil.—Incision of Michaelis completed inferiorly, either on a single side (in L), or on both sides (in a reversed Y).

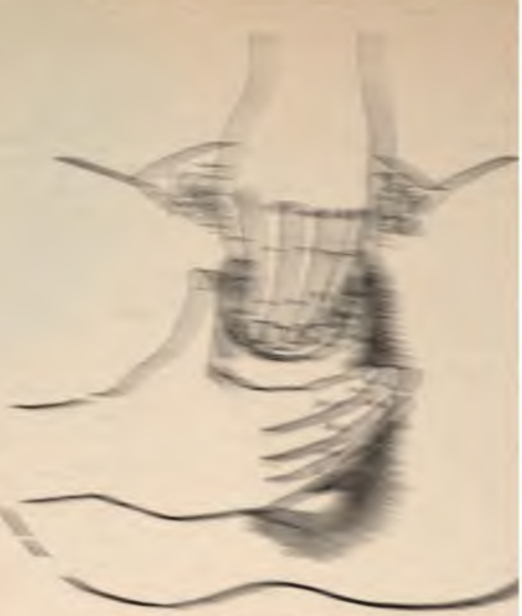


Fig. 228.—Dorsal or French position.

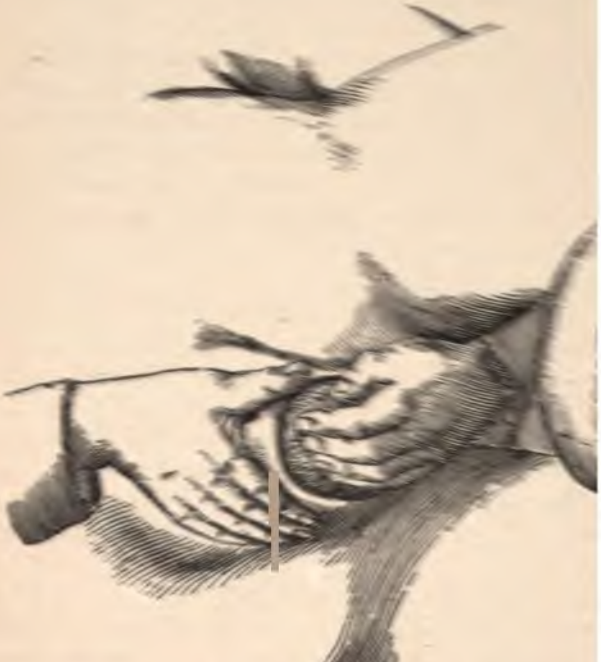


Fig. 229.—Lateral or English position.

These incisions can be made with the scissors or with a blunt-pointed bistoury.

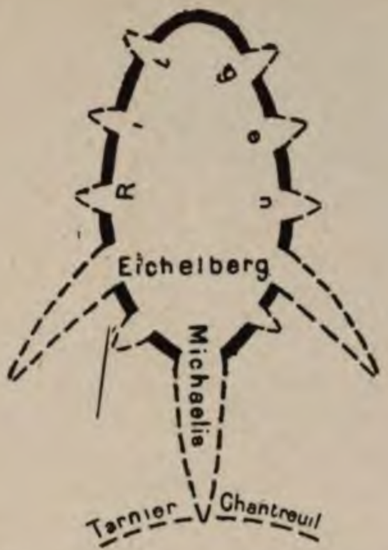


FIG. 230.—Different procedures of episiotomy.

Ritgen's procedure is insufficient. That of Eichelberg has, it is said, the disadvantage of often wounding the duct of Bartholin's gland, and of causing section of nervous filaments that remain painful after cicatrization. Michaelis' procedure, completed at need by the incisions advised by Tarnier and Chantreuil, appears inferior to that of Eichelberg and I believe the disadvantages of the latter have been exaggerated.

B. *Curative treatment.*—When the perinæal lacerations are of small extent, not exceeding half of the vulvo-anal portion, they often cicatrize by first intention, provided the lower limbs are tied together at the knees for two or three days.

To keep the two lips of the wound together the employment of serre-fines has been advised. But applied on the perinæum they are easily displaced, cause painful dragging and are, in a word, inferior to sutures.

Perineorrhaphy should be performed every time the perinæal laceration is of much extent, and especially if it is complicated. As a contra-indication has been given a too marked contusion after a laborious accouchement, but it is always better to attempt an immediate perineorrhaphy, being prepared to see it fail in unfavorable cases.

This operation should be done, if the woman has been anæsthetized for accouchement, immediately after the expulsion of the fœtus, that is, before the delivery of the placenta, otherwise, after the expulsion of the appendages, with or without previous anæsthetization, according to the conditions under which the operation is to be performed. The materials most commonly used for the sutures are: catgut, silkworm gut, silk, horsehair, or silver wire. In general silk, or, better, horsehair is chosen. The operation will be differently made according as the laceration is simple or complex.

In simple lacerations, the woman being placed in the obstetric position, on her back and with her hips near the edge of the bed, a hot antiseptic vaginal injection of a $\frac{1}{2000}$ sublimate or $\frac{1}{100}$ phenic acid solution is given and the parts thoroughly cleansed and a large tampon of iodoform gauze or absorbent cotton introduced into the depths of the vagina, to prevent the interference of the uterine discharges with the application of the sutures. With a straight or curved needle, as the operator may prefer, threaded with silk or horsehair, and held in a needle holder, all of which, as well as the hands of the operator, have been rendered thoroughly aseptic, while the vulva is kept open by an assistant, sutures are applied to the vaginal lacerations about a centimetre apart. When the edges of the vaginal membrane are completely joined, the edges of the perineal wound are brought together in the same manner, care being taken to carry the sutures beyond the surface of the laceration. The woman is then replaced in the usual position in bed, the tampon removed from the vagina, and the limbs bound together to prevent the disturbance of the wound. The after-treatment will be the same, the patient receiving the same antiseptic care as if there had been no operation, that is to say, a warm, antiseptic vaginal injection every day and the usual toilette according to the discharge. The perineal sutures are to be removed in about eight days, the vaginal later, in about fifteen days.

Complicated lacerations. When the tear is complicated, that is to say, when the recto-vaginal wall is lacerated to a greater or lesser extent, after having placed the woman in the obstetrical position and properly prepared the parts, as directed in preceding paragraph, three varieties of sutures are applied (Fig. 230a).

Rectal sutures. Continuous catgut sutures to avoid, as far as possible, their removal, otherwise, of silk, uniting the edges of the ano-rectal wall.

Vaginal sutures. Interrupted sutures of silk, or, better, of horsehair, uniting the edges of the vaginal wound.

Perineal sutures. Interrupted sutures, as with simple lacerations, with silk or horsehair. Horsehair is the best material to employ, as it is better borne by the tissues and is more easily removed.

The perineal sutures should be removed after the eighth day, the vaginal after the fifteenth; the rectal, if of catgut, will have been absorbed about the same time; if of silk, it will be necessary to remove them in about three weeks.

In case reunion is not complete, the ununited edges should be pared or roughened, after a previous application of cocaine, and brought together with one or more stitches; or, when the opening is of small extent, simply keeping the thighs together may bring about a reunion by secondary intention after primary has failed. The patient should be kept in bed for three weeks.

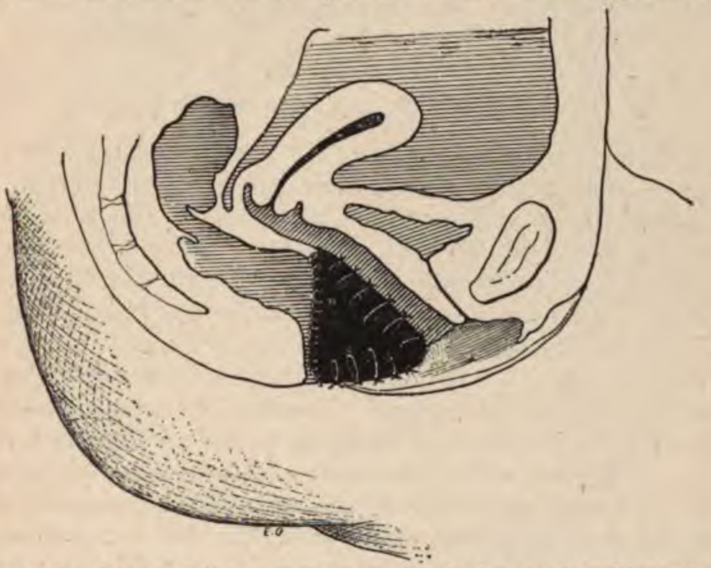


FIG. 230*a*.—Placing of the sutures in perinæorrhaphy for complicated lacerations.

Leaving aside the latero-superior wounds, which rarely claim attention, the therapeutics of lacerations will be as follows:

1. Laceration of the first degree (limited to the fourchette), no treatment necessary.

2. Laceration of the second degree (from the fourchette to the anus) (Fig. 231).

a. Slight laceration. Simple fixation of the lower limbs together for one to three days. No sutures unless the patient is unruly or the nurse inexperienced.

b. Extended laceration. Superposed sutures, one centimeter apart.

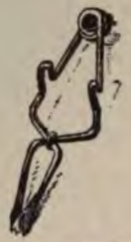


FIG. 231.—Serre-fine.

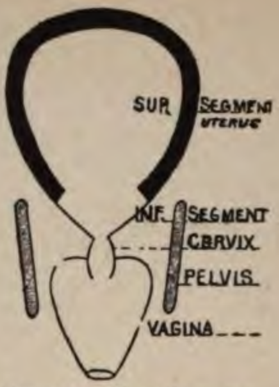


FIG. 232.—Genital passage.

3. Laceration of the third degree (or complicated): a deep and extended suture, a series of sutures as in the preceding case. At need, buried suture of the recto-vaginal septum. In the case of central laceration of the perinæum, we also have recourse to sutures, uniting the separated surfaces in all their extent.

Arrived at the close of this study of the maternal phenomena, let us take the whole at a glance. The schema of Fig. 232 represents the canal through which the fœtus must pass from the fundus of the uterus. The thick part expels the fœtus by its contraction, its role is essentially active; the thin part, on the contrary, is a long irregular sphincter which, both active and passive, opens and dilates to allow the passage of the uterine contents. Accouchement is only the struggle between the thick part and the thin part of the genital organs. Delivery (extended to the expulsion of all the ovum) is the victory of the thick segment over the thin segment; it is the denouement of the struggle which lasts a variable time.

ACCOUCHEMENT.—PHENOMENA OF THE APPENDAGES.

A. *Bag of waters.*—The bag of waters is constituted by that part of the ovuline membranes left bare by the dilatation of the uterine orifice. It is necessary to avoid, as too often occurs, the use of the term ovuline membranes as a synonym for bag of waters, for the latter represents only a part of these membranes. Its formation is caused by the dilatation of the cervix. The bag of waters may present any one of the various forms of the schema in Fig. 233. In the first variety (flat) there is only a thin layer of liquid interposed between the fœtal part and the membranes. In the projecting variety we have, according to the degree: (*a*) the hemispherical form; (*b*) the cylindrical form; (*c*) the piriform variety.

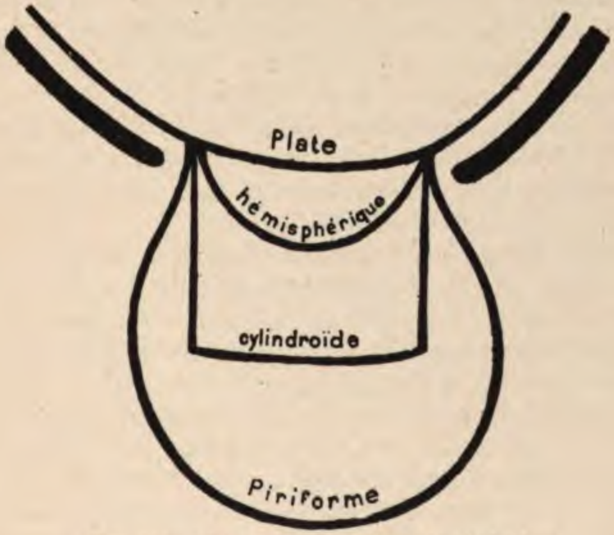


FIG. 233.—Different varities of the bag of waters.

The bag of waters is smooth when it is formed by a portion of the membranes distant from the placenta, but it becomes more and more unequal as it approaches the placental disc. These inequalities may serve as a guide to the probable situation of the placenta. Sometimes it happens that the finger, passed over the membrane, perceives in their thickness pulsations synchronous with the fœtal pulsations. This sign reveals the presence of vessels passing to an accessory or erratic cotyledon or to a velamentous insertion of the cord.

The membranes are permeable, so that the surface of the bag of waters always presents a marked humidity. This permeability plays an important part in the formation of "the show."

At a given moment the membranes rupture, the amniotic liquid is liberated, the ovum is open. By studying the mode of rupture of the membranes we shall see at the same time the constitution of the bag of waters. The membranes may rupture in two totally different ways, successively, or as a whole.

Successive rupture takes place as follows: The cervix opening and giving passage to the fœtus, the portion of the membranes which descends first and constitutes the bag of waters undergoes a notable distention, much more marked than the rest of the ovuline envelopes. The decidua, the most superficial, soon ruptures leaving uncovered a part of the chorion. The chorion and the amnion, pushed as a whole by the liquor amnii, protrude through the opening formed by the rupture of the decidua. The pushing continues, the projection increases and a new rupture follows, but contrary to what might be thought, on account of the elasticity of the chorion compared with the resistance of the amnion, it is the chorion which ruptures first. This is because its adhesion to the decidua prevents its descent or gliding on this membrane; all its ampliation at the bag of waters is made exclusively by its elasticity and not by gliding. For the amnion, on the contrary, though of little marked elasticity, gliding is easy on account of its feeble adhesion to the chorion, so that it descends without difficulty. Thus a rupture of the chorion before the amnion will be comprehended.

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The amnion remaining alone, to constitute the bag of water, continues to glide. The bag descends, pushed by the amniotic liquid and the fœtal part. This gliding of the amnion produces the detachment that is easily found by examination of the appendages after delivery. When this gliding is interrupted by any cause, compression between the fœtal part and the uterine wall, adhesion, placenta inserted in the inferior segment, too great thinness of the membrane itself, or finally under the influence of intervention by the accoucheur, rupture takes place as for the chorion and decidua, the ovum is opened, the amniotic liquid flows away, and the fœtus passes through this opening by enlarging it.

Aside from this successive rupture, there exists rupture as a whole, at once. The three membranes are ruptured at the same place. Their union remains intimate, they all three succumb at once.

According to the results I have obtained, the rupture as a whole takes place in 46 per cent of cases; successive rupture takes place in 54 per cent of cases. Successive is then the most frequent.

The situation of the rupture is variable and may occur in different places (Fig. 234, 1 2 3).

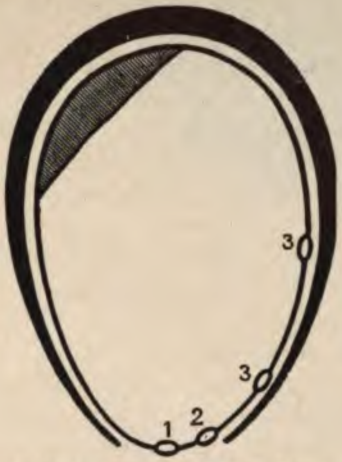


FIG. 234.—Different places of rupture of the membranes.

In relation to accouchement the rupture may occur:

Before labor—premature rupture.

During labor—1. During the dilatation of the cervix (precocious rupture); 2. at complete dilatation (tempestive rupture); 3. during expulsion (late rupture).

After labor—delayed rupture.

Premature rupture takes place fifteen days, a month, sometimes even more, before accouchement. I have seen a case where it occurred fifty days before labor, which was at the beginning of the ninth month.

Retarded rupture, that is, after the ovum has been expelled as a whole and at term is quite exceptional (four to five cases). In expulsion before term, it is never frequent.

I have put in parenthesis the terms "precocious, tempestive and late rupture" for I do not admit these distinctions based on the erroneous opinion that the bag of waters should rupture at complete dilatation in the physiological state.

It is probable, save some exceptions, that the rupture of the bag of waters is as much more favorable to accouchement as it is late. Its integrity presents a double advantage. The risks to the fœtus are less when the ovum is complete. With regard to the mother, it is certain that the bag of waters, forming an advance guard for the fœtal part, favors the dilatation of the cervix and the ampliation of the perinæum and of the vulva. This cushion of waters, spreading humidity before it, exercises a soft pressure which the maternal tissues obey better than the rude compression exercised by the fœtal part.

Whatever may be the moment of accouchement when rupture occurs, it takes place, sometimes silently, sometimes with a noise. The difference depends upon the quantity of water, which may be free to flow at the moment of rupture.

The diagnosis of the rupture of the bag of waters, generally easy, may be of excessive difficulty sometimes. Whenever intervention is necessary, and notably the application of the forceps, this diagnosis, however, is indispensable. In cases of a premature flow of the liquor amnii, the knowledge of the rupture of the ovum is the basis of a prognosis.

For the answer to this question we have three elements:

1. The shrinkage of the abdomen.
2. The flow of liquid.
3. Digital examination.

1. *The shrinkage of the abdomen.*—The rupture of the ovum, sometimes causing the evacuation of a large quantity of liquid, may diminish the abdomen so markedly that the patient, and even the accoucheur, will perceive it. However, this sign is too vague to constitute more than an adjuvant.

2. *The flow of liquid.*—When liquid, of the same color as the liquor amnii flows from the vagina, after having eliminated the possibility of an involuntary or unconscious micturition, we may question whether this is the show or the pure amniotic liquid.

Differential signs:

THE SHOW.	LIQUOR AMNII.
Stiffening the linen.	Not stiffening, or only a little.
Mucus, thick.	Liquid, not stringy.
Sometimes sanguinolent.	Of normal color, or tinted by the meconium, or again reddish, red, or deep red (maceration).
Beginning slow; progressive and continuous flow.	Beginning sudden, flowing in jets and intermittent.

It may occur that the liquor amnii has actually escaped, and yet in digital examination one may still feel a bag of waters more or less filled with liquid. There exist in this case three causes of error. The first is the existence of an amnio-chorial sac (Fig. 235). Now if this sac exists in front of the fœtal part it may be ruptured by the finger or spontaneously. The liquor amnii flows away and yet on examination there is met (Fig. 236) the intact amnion. In the second place, the rupture may have been complete, but the cervix retracting after the flow covers the opening in the membranes (Fig. 237). In the third place, the rupture of the membranes, complete, while remaining outside, the uterine orifice is obstructed by the approach of the fœtal part, which prevents the ulterior flow of liquid (Fig. 238), and again to touch there appears a bag of waters.

3. *Digital examination.*—The diagnosis of the integrity of the bag of waters is really difficult only in presentations of the vertex, for

in the other presentations the volume of the sac and the inequalities of the fœtal part scarcely permit hesitation. An experienced finger can sometimes recognize the hair of the fœtus and diagnosticate the absence of rupture. During contraction the sac becomes smooth and tense. The fœtal scalp, on the contrary, becomes wrinkled.

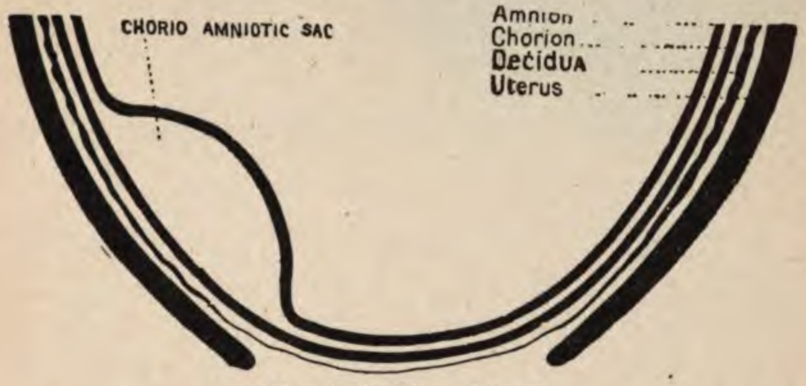


FIG. 235.—Chorio-amniotic sac.

By uplifting the fœtal head in the interval between contractions, if a flow of the liquor amnii is observed, there is evident proof of the rupture of the ovum. Finally in some cases the speculum has been introduced, but this mode of investigation is little used. The persistence with which I have sought to establish the diagnosis of the rupture, or of the integrity of the bag of waters is not superfluous, for the hydrocephalic head has been perforated at the bregma in the belief that the operator was puncturing the membranes.

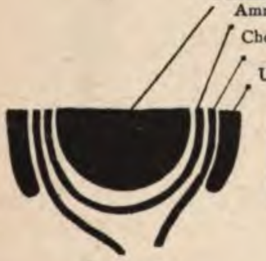


FIG. 236.

Rupture of chorion, with amnion intact.

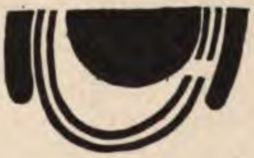


FIG. 237.

Rupture of the membrane above the uterine orifice.

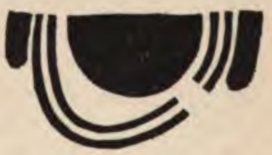


FIG. 238.

Opening of the rupture, obtructed by the approach of the fœtal part.

The elements of prognosis that can be drawn from the bag of waters depend upon its volume and upon the period of rupture. A flat bag of waters is a favorable augury; projecting, it predicts dystocia. All things being equal, the later the rupture of the bag of waters the better is the prognosis for the mother and for the child. The rule should be to leave the rupture to nature. But if, to follow some special indication (placenta prævia, hydramnios, special rigidity of the membranes), artificial rupture becomes necessary, the membranes may be opened with the finger nail, which sometimes presents difficulties, or with a carefully disinfected instrument (Fig. 239). If the bag of waters is large, the rupture should be made in the interval of the contractions and the hand should moderate the flow of liquid by closing the vulva, as a too violent escape favors the procidence of a limb or of the cord.

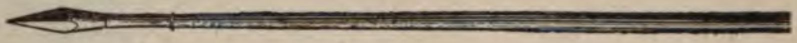


FIG. 239.—Membrane perforater of whalebone, with ivory point.

B. *The show.*—The ovuline membranes, when they are no longer reinforced by the uterine wall, are easily permeable for the liquor amnii, especially when the intra-ovuline pressure is augmented by the contractions of labor. Thus when accouchement commences, in proportion as dilatation of the cervix proceeds, the liquor amnii filtering through the membranes escapes along the vagina and from the vulva mixing with the mucus in its passage. The mixture of liquids constitutes "the show," which is, then, part ovuline and part maternal. The show is glutinous, gelatinous, due to the mixture with the cervical mucus and to the secretion of the cervical glands. This consistency favors the passage of the fœtus through the parturient canal. In general the show is of a citron color, sometimes streaked with blood. Its appearance is an indication of the onset of accouchement. With a dry vagina one can be sure, save in a pathological state, that labor has not commenced.

There are three principal exceptions to this, hydramnios, placenta prævia, an unusual resistance of the membranes, which renders them dry. In hydramnios it is well to favor the escape of the amniotic fluid ; it is necessary, therefore, to rupture the three membranes. In placenta prævia, to avoid the detachment of the placenta, it is sufficient, when it is possible, to rupture the chorion and to preserve the integrity of the amnion. Finally, in the case of unusual resistance of the membranes, a means sufficiently efficacious to arouse uterine contraction, to insert the finger between the membranes and the uterine wall as far up as possible, in such a way as to provoke contraction without breaking the membrane. The indication for rupture is therefore absolute only in the case of hydramnios, and in certain pathological conditions.

CHAPTER X.

MECHANISM OF ACCOUCHEMENT.—FŒTAL PHENOMENA.

Whatever the presentation may be, except that of the abdomen where accouchement is impossible, the exit of the fœtus takes place in six stages:

First stage—diminution.
Second stage—engagement.
Third stage—internal rotation.
Fourth stage—disengagement of the first ovoid.
Fifth stage—external rotation.
Sixth stage—disengagement of the second ovoid.

We shall examine for each presentation the details of each of these stages.

Presentation of the Vertex.—I shall take as the type the vertex presentation in L O I A, the most frequent position, and I shall speak later of the mechanism in the other positions.

1. *Diminution.*—The diminution of the head is made by moulding and by inclination of the dystocic diameters (flexion and lateral inclination). The moulding, resulting in the deformation of the head to be studied under plastic phenomena, is brought about by the over-lapping of the bones or by their depression. This variety of diminution is only of small importance in presentations of the vertex. The inclination of the dystocic diameters, on the contrary, takes a considerable part, it occurs by flexion and lateral inclination.

Flexion, by directing the chin towards the thorax, approaches to the genital axis the occipito-mental diameter (13½), the longest of the head. A moderate flexion substitutes the occipito-frontal diameter (11½) for the occipito-mental and a very marked flexion, the suboccipito-bregmatic (9½) for the occipito-mental (Figs. 240, 241 and 242). By each of these degrees of flexion there is gained two centimetres; the difference in the circumference belonging to each of these diameters is relatively much more important. The flexion becomes more and more marked in proportion as the head descends into the bony pelvis. This flexion is the normal attitude of the head in relation to the trunk and the pressure of the vertebral column during the uterine contraction only exaggerates it. Flexion is appreciated in digital examination by the relative height of the bregma and lambda. Easy access of the bregma indicates want of flexion. In proportion as the lambda approaches the center of the parturient canal the head is flexed.

The lateral inclination favors the passage of the transverse diameters of the head, in particular of the biparietal. It occurs around one of the antero-posterior diameters of the head as a pivot while flexion takes place around a transverse diameter passing in the vicinity of the occipital foramen. With regard to lateral inclination it is necessary to understand two terms, cynclitism and asynclitism. A synclitic head is that where the two parietal protuberances are found in the same pelvic plane, at the superior or the median straits, or at any region of the excavation. An asynclitic head is that where the two parietal protuberances are on different planes. Synclitism maintains the sagittal suture in the center of the pelvis. Asynclism inclines it to one side. Synclitism is unfavorable to engagement of the transverse diameters of the head and asynclitism is favorable.

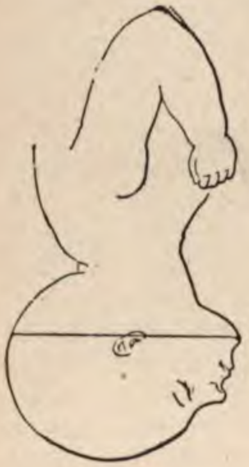


FIG. 240.
Presentation of the occipito-mental diameter, 13½ centimetres.

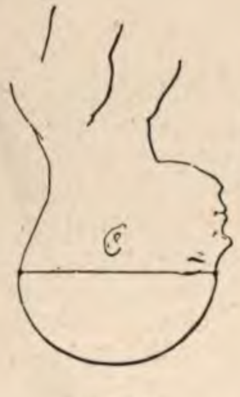


FIG. 241.
Presentation of the occipito-frontal diameter, 11½ centimetres.

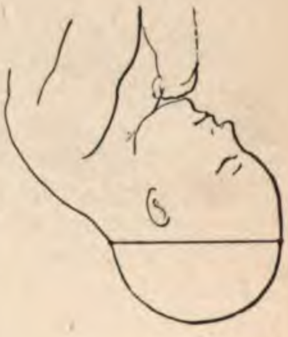


FIG. 242.
Presentation of the suboccipito-bregmatic, 9½ centimetres.

Now does the head, in its pelvic passage, descend by synclitism or by asynclitism? According to Duncan, whose opinion seems to me to be correct, the head is synclitic at the superior strait and in the superior part of the excavation, asynclitic in the inferior part of the excavation and at the inferior strait.

2. *Engagement* is the descent of the fœtal part from the superior to the median strait, the same as disengagement is its passage from the median strait to the vulvar orifice. Engagement of the vertex occurs usually during the last three months in the primiparæ. In the multiparæ it is more capricious but usually takes place fifteen days before accouchement, sometimes sooner, sometimes later, at

the moment of labor or even only after complete dilatation. What has been said on the epoch of engagement supposes the absence of all causes of dystocia.

Engagement during pregnancy takes place under a double influence—the influence of the tonicity, the contractility of the abdominal wall and the influence of utero-pelvic muscles (fibres of the broad ligaments, of the utero-sacral ligaments and of round ligaments). During labor, after complete dilatation, the action of uterine contraction is added to the preceding to produce engagement.

The engagement is usually permanent, that is, once produced it persists to the end of pregnancy. However, intermittent engagements have been noted, the fœtal part ascends after a momentary descent under the influence of the utero-pelvic muscles.

Engagement is defined by the region of the pelvis where is found, not the most inclined part of the head, but the largest part represented by the biparietal diameter. We say then:

Head at the superior strait;
Head in the superior or inferior part of the excavation;
Head at the median strait;

when the biparietal diameter is at the superior strait, in the superior or inferior portion of the excavation, or at the inferior strait.

3. *Internal rotation.*—The head in its descent accommodates itself to the dimensions of the parturient canal and thus is placed:

Transverse, at the superior strait.
Oblique, in the excavation.
Direct, at the median strait.

The rule is that the occiput turns forward, the exception, as we shall study under anomalies, is backward rotation; so that at the median strait the head is generally found in the occipito-pubic position. There have been long discussions as to the reason why the occiput, placed transversely at the superior strait, accomplishes in descent, its evolution forward rather than backward. The reason is probably the curve of the parturient canal, as its axis describes an anterior concavity in such a way that the lowest point of the head is naturally directed forward to follow the shortest path outward.

4. *Disengagement.*—The disengagement begins at the median strait and terminates at the vulva. The head escapes from the muscular pelvis by a movement of extension. Engagement is characterized by flexion of the head and passage through the bony pelvis; disengagement is characterized by extension and passage through the muscular pelvis (Fig. 243).

The head, pushed by utero-abdominal contraction, opens, depresses and hollows out the perinæum. This structure pushing in the opposite direction, there result two opposed forces which direct the head toward the vulvar orifices. In this movement of exit the head is so placed that the occipito-cervical groove comes under the symphysis pubis and from this movement, obeying the action of the perinæum, it accomplishes around this groove a hinge movement which brings successively to the vulva the suboccipito-bregmatic, the suboccipito-frontal and the suboccipito-mental diameters, in such a manner that there appear in turn at the perinæal fourchette the nose, the mouth, and the chin. As soon as disengagement is terminated, the head, no longer supported by the perinæum, falls in flexion.

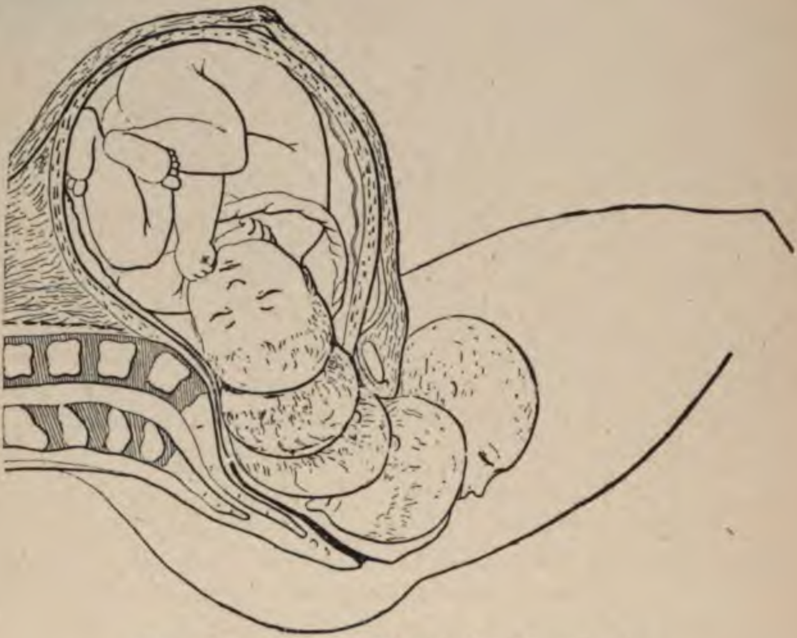


FIG. 243.—L O I T then L O I A. Normal engagement and disengagement in O P (Schultze).

5. *External rotation.*—From the utero-abdominal contraction, which follows disengagement, the head undergoes a movement of external rotation, which directs the occiput to the left (we are supposing a L O I A). This external rotation of the head is only the external manifestation of the internal rotation of the shoulders, which, placed transversely at the superior strait, turns like the head in descending, being placed first obliquely, then in the coccypubic diameter.

6. *Disengagement of the trunk.*—Pushed by the utero-abdominal contraction the cormic ovoid is disengaged little by little at the vulva, where appear successively the throax, the abdomen, and the breech.

Thorax.—The most difficult part of the thorax to deliver is the bisacromial diameter. Classic authors admit that the anterior shoulder first appears and is partially disengaged under the pubis, then undergoes a movement of arrest, during which the posterior shoulder, after having passed over the vaginal surface of the perinæum, is disengaged in turn; the anterior shoulder then terminates its exit.

This mechanism is, in fact, observed quite often, but I believe it to be pathological and due to the action of the weight of the head which thus drags the anterior shoulder out before the time for its normal exit. The normal mechanism of the exit of the shoulder is, according to my observation, the following: While the anterior shoulder is arrested and hidden behind the symphysis pubis, the posterior shoulder is first disengaged from the vulva and after its exit the anterior shoulder is disengaged in turn. This mechanism only takes place when the head is sufficiently sustained to avoid the pernicious influence of its weight.

Abdomen.—The abdomen, a soft and impressible region, is disengaged without difficulty. During its exit the spine ascends slightly toward the pubis, the trunk undergoing a slight degree of rotation.

Breech.—The maternal organs, so largely opened by the successive disengagements, allows the fœtal breech to escape easily, sometimes abruptly, one hip in front, the other behind, as in the case of the shoulders. The anterior is usually disengaged a little before the posterior, but this mode depends upon the direction given the trunk of the fœtus and is of little importance.

The mechanism in each position.—I have taken as the type, in the description of the mechanism, L O I A; a few lines will be sufficient to complete what is necessary with regard to the other positions.

R O I A.—The internal rotation of the head follows the same as in L O I A, the occiput under the pubes; but the external rotation occurs in such a way that the occiput turns toward the right side, while it was directed toward the left in L O I A.

In a general way we can say that, in all the positions, the occiput in the fifth stage returns to the side where it is found in the interior of the genital organs.

L O I P.—The interesting point in the mechanism is here in the third stage for, the same as in the previous corresponding position, the occiput turns forward to be placed under the symphysis pubis. The occiput turns forward because the head, placed in the occipito-pubic position, is much better adapted to the genital canal than the occipito-sacral. The last three stages present no peculiarity. The external rotation of the occiput is made to the left as in L O I A.

R O I P.—The considerations are the same as for the preceding position. Internal rotation of the occiput forward. External rotation of the occiput to the right.

I shall not speak of the transverse positions, as they are converted into the oblique in the excavation, nor of the direct O P, O C, which proportion as it advances. The lambda and the contiguous part of the parietal bones are first disengaged from the vulva and the head is extended. When the occipito-cervical groove arrives at the fourchette, there appear successively at the superior portion of the vulva, the bregma, the forehead, the nose and finally the chin. There is a hinge movement analogous to the occipito-pubic, but here it is produced around the fourchette.

4. *Disengagement of the head.*—The rule is the occipito-pubic and I only recall the occipito-sacral which we have just discussed. A simple mention of excess of slowness or of rapidity during disengagement is sufficient. The first exposes the life of the fœtus, the second, the integrity of the maternal perinæum.

5. *External rotation.*—This rotation may not occur, the shoulders being expelled from the vulva transversely, or incomplete, the shoulders disengaging obliquely. Rotation may occur in an opposite direction. This anomaly is due to an excess of rotation of the shoulders during the disengagement of the head.

6. *Disengagement of the trunk.*—We have seen the anomalies of disengagement of the shoulders. The irregularities of the exits of the abdomen and of the breech simply depend upon the situation of the vertebral column. Their importance is secondary.

Presentation of the face.—I shall take as a type L M I A.

1. *Diminution.*—Moulding, extension and lateral inclination. The moulding is slight with regard to the face but it is produced on the vault of the cranium. Extension places the axis of the cephalic ovoid parallel to that of the parturient canal. Lateral inclination occurs with regard to the bimalar diameter.

2. *Engagement.*—The engagement, that is, the descent from the superior to the median strait, is only observed during labor and usually at an advanced period of labor. In proportion as it occurs extension is complete; the chin approaches the center of the parturient canal, and the lambda the vertebral column. The height of the head in the pelvis is generally designated by that of the bimalar diameter.

3. *Internal rotation.* — This movement directs the chin forward under the symphysis pubis.

4. *Disengagement of the head.*—The head, during the fourth stage traverses all that part of the genital canal comprised between the median strait and the vulva. This disengagement is made by a movement of progressive flexion. The chin arrives under the pubic symphysis, which is exactly applied in the mento-cervical groove; around this the head executes a hinge movement and there successively appears, in front of the perinæal fourchette, the forehead, the bregma, and finally the occiput. The expelled head falls backward.

scarcely exist except at the median strait and simply represent one of the moments of the mechanism of the delivery.

Irregularities of the mechanism.—Irregularities of the mechanism may present in each of the stages of accouchement:

1. *Diminution.* — The cephalic moulding will be interfered with when ossification is too much advanced. When flexion of the head is insufficient, a presentation of the brow or even of the face may arise. Lateral inclination also presents variations of secondary importance, and which cause, especially in the pathological pelvis, inclined presentations.

2. *Engagement.*—In multiparous women, whose soft tissues are very supple, the same utero-abdominal contraction sometimes produces both engagement and disengagement, bringing the head from the superior strait to the vulvar orifice.

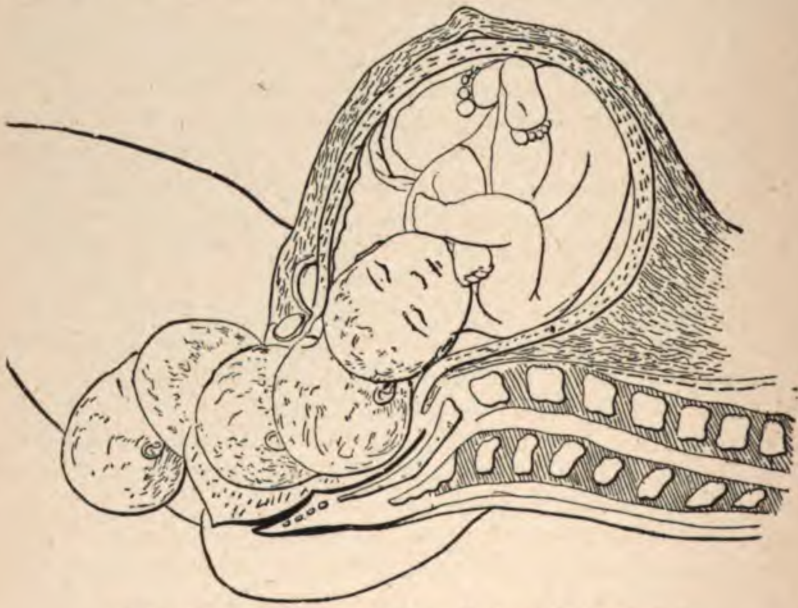


FIG. 244.—R O I T then R O I P. Abnormal disengagement of the head in O S (Schultze).

3. *Internal rotation.*—The movement of rotation may occur too soon or too late, for example, when the occiput only turns forward when the head arrives in the vicinity of the vulva. This retardation is frequent when the fœtus is small or the pelvis very large. The principal anomaly of this stage of accouchement is rotation of the occiput backward. In the occipito-posterior position, right or left, and exceptionally in the anterior, the occiput may turn backward and the head thus be placed in the occipito-sacral position. The exit of the head then takes place as indicated in Fig. 244. The occiput passes over the posterior vaginal wall, the head is flexed in

proportion as it advances. The lambda and the contiguous part of the parietal bones are first disengaged from the vulva and the head is extended. When the occipito-cervical groove arrives at the fourchette, there appear successively at the superior portion of the vulva, the bregma, the forehead, the nose and finally the chin. There is a hinge movement analogous to the occipito-pubic, but here it is produced around the fourchette.

4. *Disengagement of the head.*—The rule is the occipito-pubic and I only recall the occipito-sacral which we have just discussed. A simple mention of excess of slowness or of rapidity during disengagement is sufficient. The first exposes the life of the fœtus, the second, the integrity of the maternal perinæum.

5. *External rotation.*—This rotation may not occur, the shoulders being expelled from the vulva transversely, or incomplete, the shoulders disengaging obliquely. Rotation may occur in an opposite direction. This anomaly is due to an excess of rotation of the shoulders during the disengagement of the head.

6. *Disengagement of the trunk.*—We have seen the anomalies of disengagement of the shoulders. The irregularities of the exits of the abdomen and of the breech simply depend upon the situation of the vertebral column. Their importance is secondary.

Presentation of the face.—I shall take as a type L M I A.

1. *Diminution.*—Moulding, extension and lateral inclination. The moulding is slight with regard to the face but it is produced on the vault of the cranium. Extension places the axis of the cephalic ovoid parallel to that of the parturient canal. Lateral inclination occurs with regard to the bimalar diameter.

2. *Engagement.*—The engagement, that is, the descent from the superior to the median strait, is only observed during labor and usually at an advanced period of labor. In proportion as it occurs extension is complete; the chin approaches the center of the parturient canal, and the lambda the vertebral column. The height of the head in the pelvis is generally designated by that of the bimalar diameter.

3. *Internal rotation.*—This movement directs the chin forward under the symphysis pubis.

4. *Disengagement of the head.*—The head, during the fourth stage traverses all that part of the genital canal comprised between the median strait and the vulva. This disengagement is made by a movement of progressive flexion. The chin arrives under the pubic symphysis, which is exactly applied in the mento-cervical groove; around this the head executes a hinge movement and there successively appears, in front of the perinæal fourchette, the forehead, the bregma, and finally the occiput. The expelled head falls backward.

5. *External rotation.*—The chin turns to the side to which it was primarily directed.

6. *The disengagement of the trunk* is subject to the same considerations as for the vertex presentations.

The mechanism in each position.—As for the vertex only the oblique position will be in question here.

L M I A has been taken as the type and described already.

R M I A.—The internal rotation turns the chin forward, and the external turns the chin toward the right thigh.

L M I P.—The internal rotation brings the chin forward and the external carries it toward the left thigh.

R M I P.—Internal rotation of the chin forward, and external toward the right thigh.

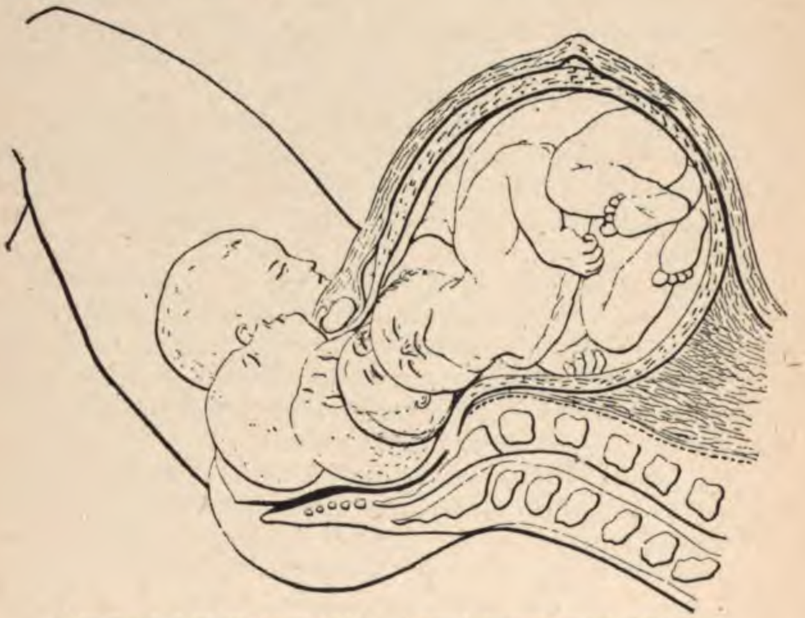


FIG. 245.—**L M I T then L M I A.** Normal disengagement of the head in M P (Schultze).

Irregularities of the mechanism.—1. *Diminution.*—The extension may be insufficient and render engagement difficult.

2. *Engagement.*—As much more easy as the extension is more marked. More rapid in the mento-anterior than in the posterior. Prompt in a large multipara, slow and painful in a primipara.

3. *Internal rotation.*—The chin, in place of turning forward, may turn backward toward the coccyx. This becomes, as we shall see, in disengagement, a grave cause of dystocia.

4. *Disengagement of the head.*—When the rotation of the chin takes place backward, disengagement cannot take place. Accouchement in a mento-sacral position is impossible. I deduce from this the

following therapeutic conclusion, which should be graven on the mind of every physician: Whenever, in a presentation of the face, the chin is turned backward, it is necessary to bring it forward; without this, even with the aid of forceps, accouchement is impossible. Why this impossibility? The head, in a face presentation, may be divided into three zones (Fig. 246). The first is exclusively cephalic.

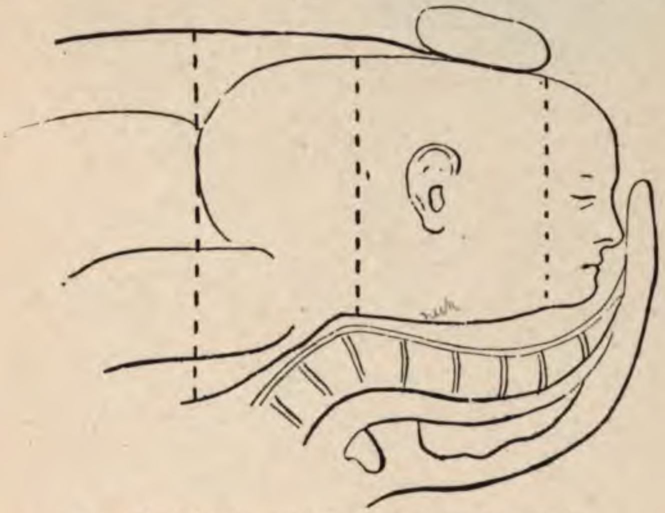


FIG. 246.—The three cephalic zones of face presentation.

The second comprises the head and the neck, and the third is composed of the head and thorax, with the dependent shoulders. Now the first two zones can penetrate without difficulty into the excavation, but the third is too large in the child at term to pass the superior strait. When the chin is turned forward it can be disengaged under the pubic symphysis without the necessity of the engagement of the third zone; but when it is turned backward, the disengagement of the chin in front of the fourchette is impossible without the engagement of the third zone.

Let us retain this impossibility as the rule, in a practical point of view, though recognizing that there exist some exceptions. Mme. Lachapelle has observed disengagement in a mento-transverse position and Smellie has even seen it in the mento-sacral.

5 and 6. *External rotation and disengagement of the trunk* present the same anomalies as in vertex presentations.

Presentation of the brow.—I shall take as a type R M I T.

1. *Diminution.*—In presentation of the brow there can be no question of flexion or of extension, for flexion causes transformation into vertex, and extension into face presentation. The head is diminished solely by moulding. The result of this is a deformation characteristic of this part of the body (see plastic phenomena).

2. *Engagement.*—The head remains usually a long time at the superior strait and engages still later than in presentation of the face. The head descends slowly and with difficulty. The height of the head is designated by that of the frontal protuberances.

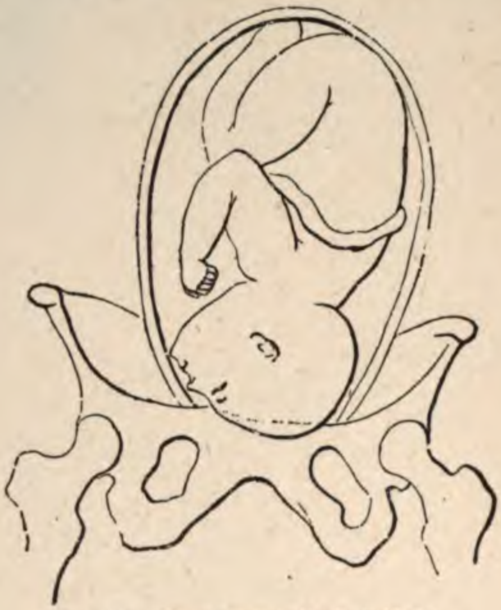


FIG. 247.—Brow presentation in R M I T.

3. *Internal rotation.*—As in the other presentations of the cephalic ovoid the head is placed transversely at the superior strait, obliquely in the excavation, and direct at the median strait. The chin in its descent usually turns forward; exceptionally it turns backward.

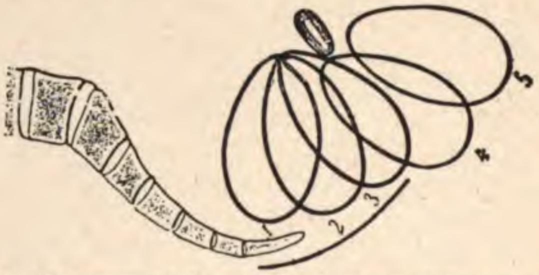


FIG. 248.—Disengagement of the head in brow presentation: mento-pubic.

4. *Disengagement of the head.*

a. Mento-pubic.—The head descends little by little, depressing and opening the pelvic floor. The bregma always remains in the center of the parturient canal or near it. The fœtal part finally arrives at the vulva and escapes by the mechanism represented in Fig. 248.

b. Mento-sacral.—The head having passed the median strait continues its descent. The occiput strikes against the symphysis pubis and a swinging movement follows which carries the chin outward first. The occiput makes its exit last (Fig. 249).

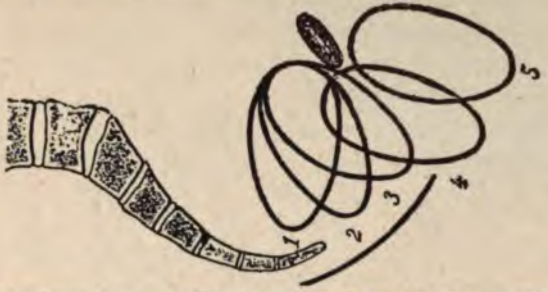


Fig. 249.—Disengagement of the head in brow presentation: mento-sacral.

5 and 6. *External rotation and disengagement of the trunk* occur exactly as in presentation of the vertex.

Mechanism in each position.—I have taken as the type for description a R M I T at the superior strait, and I have shown the mechanism according as the chin turns forward (R M I A, M P) or backward (R M I A, P S). The same considerations apply to L M I T according as the chin turns forward (L M I A) or backward (L M I P); new descriptions are useless.

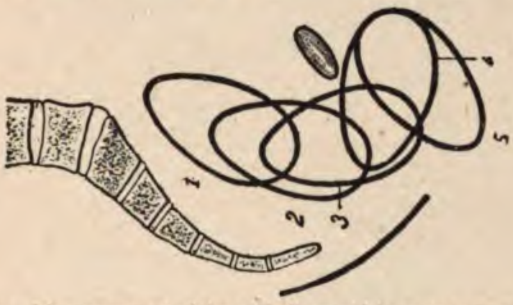


Fig. 250.—Disengagement of the cephalic ovoid in vertex presentation.

Resume.—All authors, who have described presentation of the forehead, have endeavored to prove the analogy between the mode of exit in presentations of the brow and of the vertex. I shall not follow this demonstration. In place of seeking the analogy, I shall point out the differences. Presentations of the vertex and of the face are, as well as their mechanism, normal, physiological. The cephalic ovoid presents by its large extremity (Fig. 250) or by its small extremity (Fig. 251), which descends first in the parturient canal and escapes first at the vulva, making easy exit by a swinging movement of the remainder of the ovoid. It is otherwise in accouchement by the brow. The fœtal part, retained at the superior strait, pushed in a vicious direction, remains intermediate between flexion and extension. The head descends in spite of its vicious situation, it is deformed and thus badly engaged, badly directed, and is obliged to issue from the genital canal by a peculiar mechanism, not at all comparable to the normal physiological mechanism. From this arises numerous difficulties that are frequent sources of dystocia.

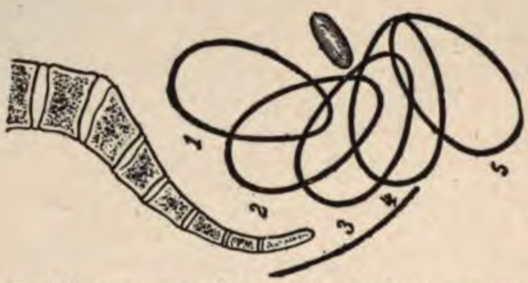


FIG. 251.—Disengagement of the cephalic ovoid in face presentation.

Presentation of the breech.—I recall in Fig. 252 the four varieties of presentation of the breech: Complete; incomplete; variety of the buttock; of the knees; of the feet.

I shall take as a type a presentation of the complete breech in L S I A.

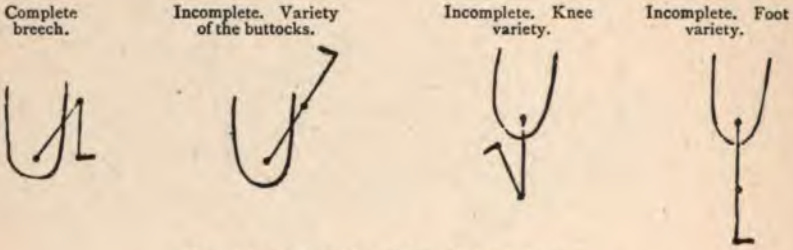

Complete breech. Incomplete. Variety of the buttocks. Incomplete. Knee variety. Incomplete. Foot variety.

FIG. 252.—Varieties of breech presentation.

1. *Diminution.*—The diminution may be compared in spite of important differences to the molding of the head in vertex presentations. The breech undergoes during its descent movements of flexion and extension (bitrochanteric axis) or of lateral inclination (sacro-pubic axis), analogous to the movements of the head but of less importance. It is sufficient to know that the buttocks are synclitic at the superior strait and asynclitic at the inferior strait, the anterior being the lower.

2. *Engagement.*—The engagement is the descent of the breech from the superior strait to the median. When the breech is complete engagement takes place only during labor and even at an advanced period of labor, in general at complete dilatation. The height of the breech will be indicated by that of the bitrochanteric diameter.

3. *Internal rotation.*—The bitrochanteric diameter, the most voluminous of the pelvic extremity, rules the movement of rotation. In spite of its predominant dimensions the bitrochanteric diameter is not placed transversely at the superior strait, but obliquely. The cause is in part the back, in part the smaller members, which are pushed aside by the projection of the vertebral column and thus impede the transverse accommodation of this diameter. The bitrochanteric diameter, oblique at the superior strait, remains oblique in the excavation, and is placed antero-posteriorly at the median strait. It is the trochanter nearest to the pubes (the left in L S I A) which turns forward.

4. *Disengagement of the trunk.*—The breech advances little by little. The trunk undergoes a lateral inflexion (Fig. 253) analogous to extension for the vertex. The anterior thigh escapes first from the vulva, then the posterior. Upon the arrival of the abdomen, the trunk undergoes a very slight movement of rotation which inclines the vertebral column a little forward. This movement is soon corrected by the descent of the shoulders, which are placed in the antero-posterior direction. The arms are against the trunk (a contrary condition is pathological), the elbow appears first, then the shoulder, the anterior being disengaged first, and then the posterior (Fig. 254).

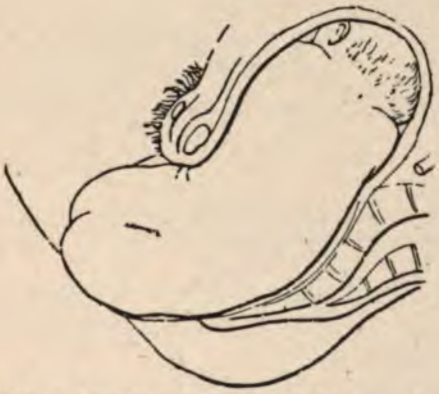


FIG. 253.—Lateral inflexion of the trunk in accouchement by the breech (Hodge).

5. *External rotation.*—This movement will be comprehended if we observe a child attempting to pass between two bars of a gate. It engages first the head, the face looking upward, then, for the trunk, one shoulder is put forward, the other backward, the body passes easily now if the space is sufficient. The child has unconsciously accomplished the movement of rotation, which permits the successive adaptaion of the head and trunk to the space through which they must pass. External rotation brings the vertebral column forward

so that the head is placed in the occipito-pubic position. Whether first to last, then, the head becomes occipito-pubic in issuing from the genital organs.

6. *Disengagement of the head.*—The head, generally aided by the accoucheur, is disengaged by a swinging movement, or by a hinge movement around the pubes, analogous to that of the vertex presensation, but the head being turned in the opposite direction there successively escape from the vulva, at the fourchette, the chin, the mouth, the nose, the eyes, and the forehead; after the passage of the frontal protuberances the head escapes brusquely.

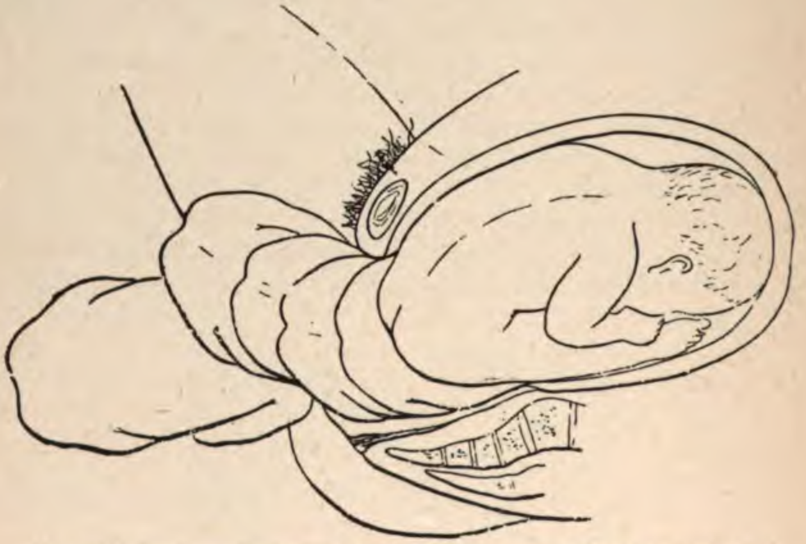


FIG. 254.—Successive disengagement of the trunk (variety of the buttocks is here represented; disengagement is the same, with complete breech).

Mechanism in each position and in each variety of presentation.—*Position (complete breech).*—L S I A has been taken as the type and described above.

R S I A.—The right buttock turns forward from left to right to be placed under the pubes. The rotation of the occiput is always made under the symphysis and disengagement is occipito-pubic.

L S I P.—The left buttock turns forward and from left to right.

R S I P.—The right thigh turns forward and from right to left.

Varieties of presentation.—The complete breech has been taken as the type of the mechanism. All that has been said applies to this variety.

Incomplete breech, variety of the buttocks.—The engagement in this variety often occurs during pregnancy. This precocity is due to the relative diminution of the fœtal pelvis by the extension of the

lower limbs. The different stages are executed as in presentation of the complete breech, with the difference that the extention of the impeding the movement of lateral flexion.
lower limbs renders disengagement of the trunk more difficult by

Incomplete breech, variety of the knees and feet.—These varieties are only constituted at the moment of accouchement; they are secondary. The engagement and the disengagement of the trunk are more rapid, on account of the diminution of the breech. The exit of the head is relatively more difficult than in the other varieties because the dilatation of the maternal parts has been less complete. The first parts which appear at the vulva are naturally, according to the variety, the feet or the knees.

Irregularities of the mechanism—1. *Diminution* may be difficult on account of the spreading apart of the lower limbs.

2. *Engagement* only occurs at the superior strait when the breech presents in the oblique position. In the sacro-pubic or sacral the presence of the lower limbs renders this difficult. In the sacro-transverse, the bitrochanteric diameter finds difficulty in passing the promonto-pubic.

3. *Internal rotation.*—The internal rotation may be incomplete or exaggerated and an oblique disengagement results. If an anomally of rotation places the bitrochanteric diameter transversely, disengagement is made in this situation.

Disengagement of the trunk.—Besides the irregularities which have been in question, the arms may be uplifted in the attitude of diving. This complication is the result of tractions on the trunk and is not generally observed when the accouchement has been left to the forces of nature alone.

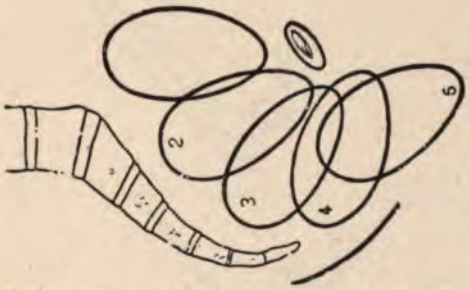
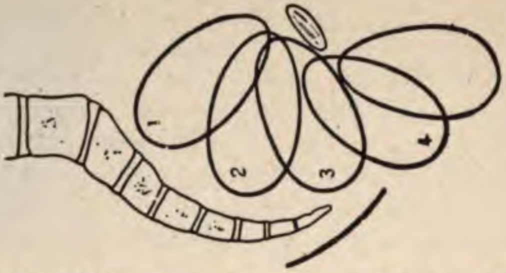


FIG. 255.—Head last disengaging in occipito-sacral, by a posterior swinging movement (disengagement back to back).

5. *External rotation.*—The occiput, in place of turning forward, may remain transverse or even directed backward. Serious difficulties of disengagement result from this.

6. *Disengagement of the head.—Occiput transverse.*—The head escapes somewhat as in occipito-pubic, only a hinge movement takes

place around one of the ischio-pubic rami, and all the elements of the face successively appear at an opposite point of the vulva.



FIG, 256.—Head last disengaging in occipito-sacral, by an anterior swinging movement (disengagement abdomen to abdomen).

Occiput posterior.—The disengagement is executed in two ways: *a.* By a movement of posterior swinging (Fig. 255)—a hinge movement is made around the fourchette and disengagement back to back occurs. *b.* By a movement of anterior swinging (Fig. 256)—the chin hooks behind the symphysis pubis, the head is progressively flexed, the occiput, turned backward, arrives at the vulva—the disengagement is abdomen to abdomen.

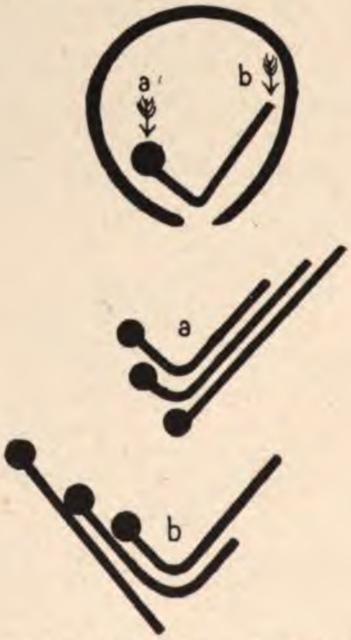
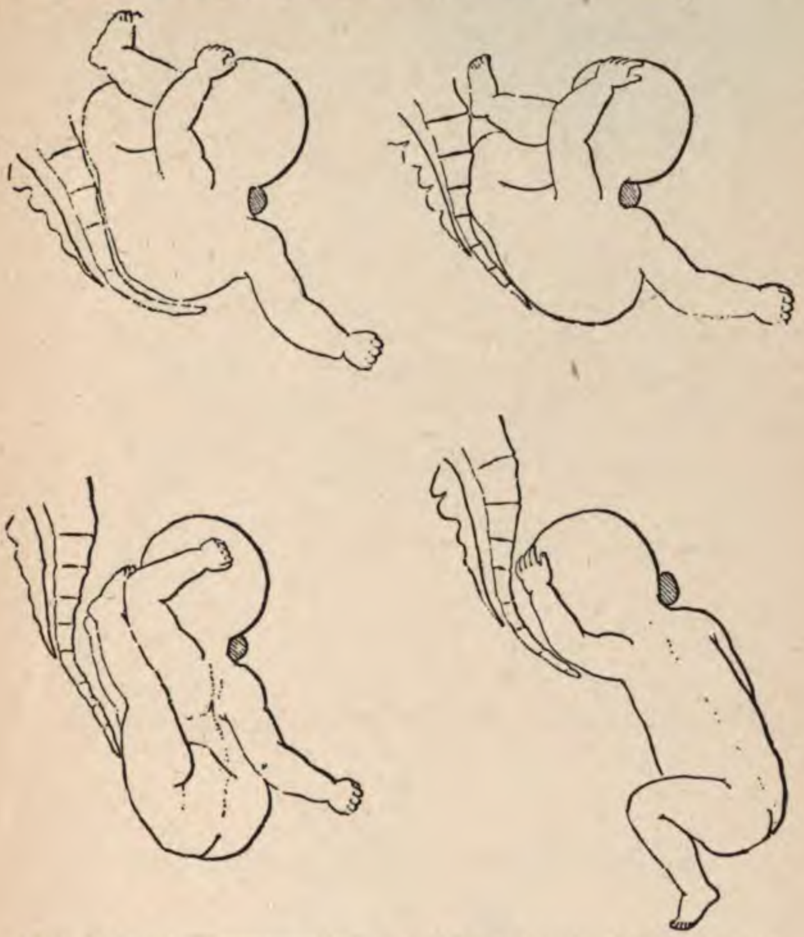


FIG. 257.—Presentation of the thorax. a, transformation into vertex; b, transformation into breech.

Presentation of the thorax.—In the different presentations that we have already studied, the accouchement may terminate in two ways:

1. By transformation of one presentation into another, vertex into brow and into face, breech into vertex, etc., there is produced a veritable mutation.

2. By a mechanism in six successive stages.



FIGS. 258 to 261.—Spontaneous evolution. Different attitudes of the fœtus during the successive disengagement of the trunk (Spiegelberg).

In presentation of the thorax, the accouchement, when it takes place, is terminated: 1. By transformation of the presentation, called *spontaneous version*. 2. By a mechanism analogous to that of the other presentations, here designated as spontaneous evolution.

Spontaneous version and evolution are terms usually reserved for presentations of the shoulder, but they imply no special character. The only peculiarity of presentations of the thorax is, that, in the usual conditions, they do not terminate in spontaneous accouchement. It is always necessary to interfere when the fœtus presents by the thorax. Spontaneous version and evolution should, then, be considered as exceptions, that we should know, nevertheless, as they confirm the general laws of the mechanism of accouchement. Their interest is consequently more theoretical than practical.

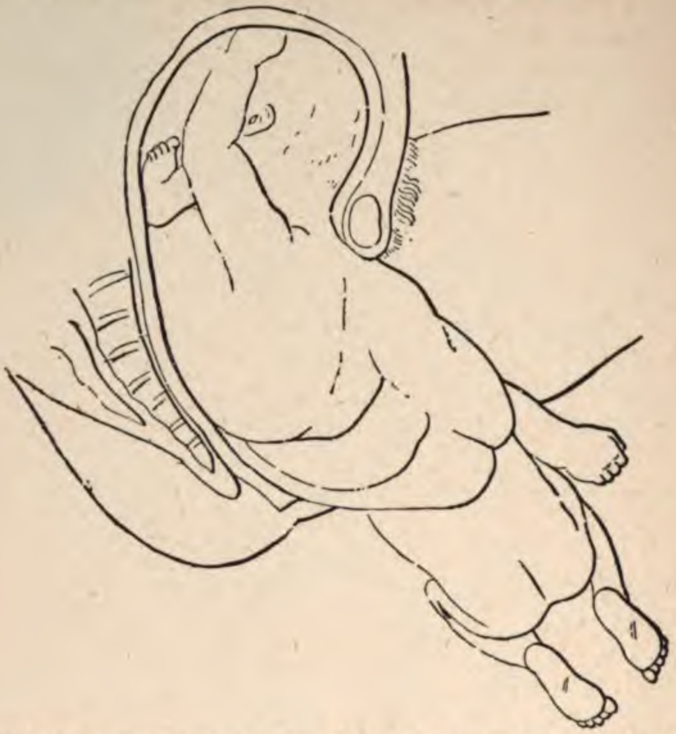


FIG. 262.—Spontaneous evolution. Successive disengagement of the trunk.

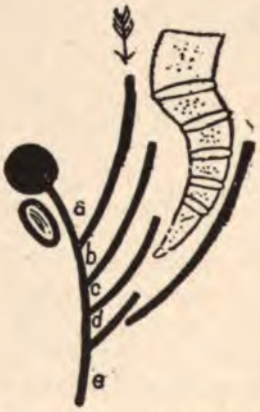


FIG. 263. —Schema of disengagement of the trunk in spontaneous evolution.

1. *Spontaneous version* (*or mutation of the presentation*).—Under the influence of uterine contraction, and before engagement of the fœtal part, the thorax is seen to draw away from the superior strait

and be replaced at that point by the head or the breech. The presentation of the thorax is then transformed in the first case into a vertex presentation, spontaneous cephalic version; in the second case into a breech presentation, spontaneous pelvic version. Though this change is easier during integrity of the bag of waters it may take place after its rupture. The subsequent accouchement of the breech or the head follows the usual rules.

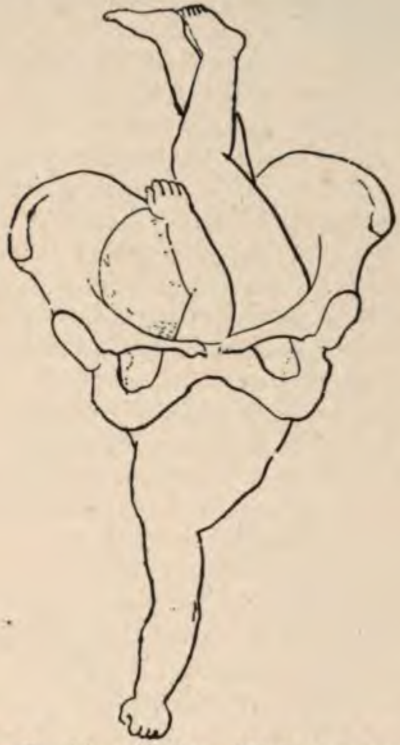


FIG. 264.—Expulsion of the fœtus folded in two (conduplicato corpore) (Kleimvachter).

2. *Spontaneous evolution* (*or normal mechanism of the accouchement*).—The back and the sternum constitute such rare varieties of presentations of the thorax that they may be neglected in the point of view of spontaneous evolution, so it is only the presentation of the shoulder (right or left) that I shall discuss here.

I shall take as the type a presentation of the right shoulder in R A I T.

1. *Diminution.*—The diminution is made in proportion to the engagement. The adherence of the upper limb to the trunk becomes more and more intimate (unless it is drawn down and the head is at the vulva) and the thorax and the abdomen are successively molded to traverse the parturient canal.

2. *Engagement.*—The shoulder, which forms the culminating part of the presentation, descends by following very nearly the axis of the parturient canal. The shoulder first, then the thorax and neck folded together, advance progressively and with difficulty. This movement of descent is arrested at the moment when the head arrives in contact with the upper part of the pubes.

3. *Internal rotation.*—As in all other presentations, the fœtal part, transverse at the superior strait, is obliquely placed in the excavation, and antero-posteriorly at the median strait. The head is placed forward in such a way that the neck measures the height of the pubes. The trunk is directed backward. This situation of the fœtus is indispensable for disengagement.

4. *Disengagement of the trunk.*—The fourth stage is the most interesting and at the same time the most difficult part of spontaneous evolution. The fœtus first becomes indented (Fig. 258), the indentation is accentuated (Fig. 259), the fœtus is soon folded on itself (Fig. 260), and finally the breech continuing to descend, while the head remains immobile, the exit of the trunk is complete (Fig. 261).

5, 6.—*External rotation and disengagement* of the head take place identically as in presentation of the breech.

Mechanism in each variety of presentation and of position.—Whatever may be the variety of the presentation, right or left shoulder, and of postion, R A I T or L A I T, the mechanism is analogous, rotation of the head and neck forward and disengagement by an unrolling of the trunk (Figs. 262 and 263).

Irregularities of mechanism.—The mechanism of spontaneous evolution being relatively rare, the anomalies are still more rare. A single one merits mention, the exit of the fœtus folded in two parts as in presentation of the abdomen (Fig. 264).

Spontaneous version, permitting the birth of a living child, only occurs in about one case out of forty. This is to say that one should always interfere in these presentations. We shall see how in an subsequent chapter.

Presentation of the abdomen.—When a child presents by the abdomen, whatever the variety (lumbar regions, right or left flank, umbilicus), spontaneous accouchement at term is impossible. However, with particularly supple fœtus, already dead some time, or before term, the fœtus may make an exit bent double (Fig. 264). In presentation of the abdomen the indications for interference are absolute.

CHAPTER XI.

INFLUENCE OF ACCOUCHEMENT ON THE MOTHER AND ON THE CHILD.

Influence of accouchement on the mother.—*Nervous system.*—Thereoften exists a marked state of restlessness and anxiety, sometimes a veritable passing delirium and without importance. There are frequent cramps in the lower limbs, due to the compression of the obdurator nerve and of the great sciatic.

Calorification.—Elevation of the temperature some tenths of a degree, but no fever in the normal state.

Respiration.—Accelerated, interrupted by cries and complaints.

Digestion.—Frequent vomiting during labor. It appears that the uterine contractions cause those of the stomach. Sometimes labor commences by an indigestion. As soon as the pains become intense the woman feels a disgust for food and drink, and it is better to exclude food, for the ingestion of liquids or solids often causes vomiting.

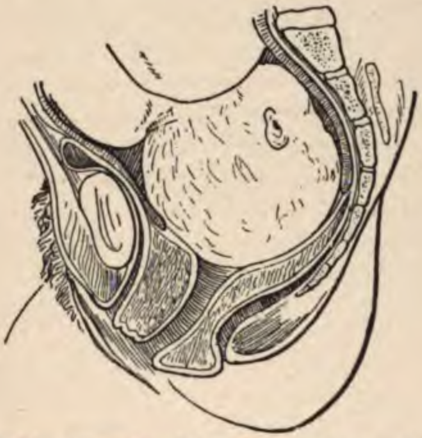


FIG. 265.—Formation of the sero-sanguineous swelling.

Influence of accouchement on the child.—The influence of the uterine contraction on the fœtal circulation has already been explained. The most interesting influence on the fœtus consist of the different deformations that accouchement produces, which have been designated as plastic phenomena. These plastic phenomena are of two kinds, one causing a deformation of the soft parts and producing a sero-sanguineous protuberance, the other addressed to the skeleton and characterized by an osseous deformation.

1. *Sero-sanguineous protuberance.*—On the fœtal part left bare by the dilatation of the cervix there is formed, in the subcutaneous cellular tissue, a sero-sanguineous infiltration (caput succedaneum). The skin at this point presents a color sometimes red, more often violaceous and quite clearly circumscribed. This, added to the doughiness of the subjacent tissues, permits an easy diagnosis after birth. Sometimes there exists congestion of the periosteum and also of the pia mater, and of the brain if it relates to the head.

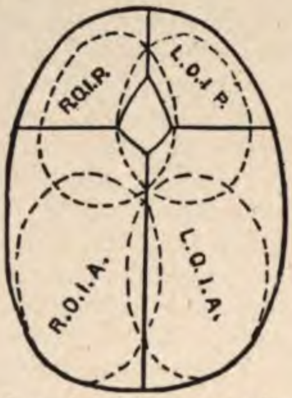


FIG. 266.—Vertex; different sites of the sero-sanguineous swelling according to the position.

The mechanism by which this sero-sanguineous swelling is produced is only that of cupping (Fig. 265). The situation of the swelling naturally varies with the presentation (Fig. 266). The sero-sanguineous swelling has only the inconvenience of deforming the fœtal region on which it is situated. It disappears in three or four days and demands no special treatment.

2. *Osseous deformations* of the fœtal head caused by the over-laping of the bones. The general result of this over-riding is a change in the configuration of the head as indicated in the subjoined figures.

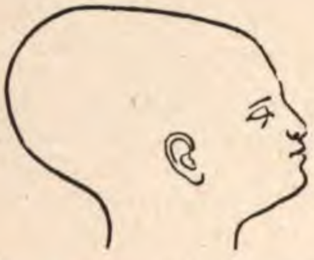


FIG. 267.—Form of the head after expulsion in left or right occipito-anterior vertex presentation (Tarnier).

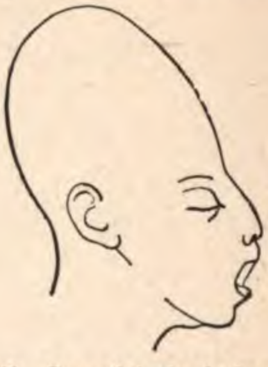


FIG. 268.—Form of the head after expulsion in left or right occipito-posterior vertex presentation (Tarnier).

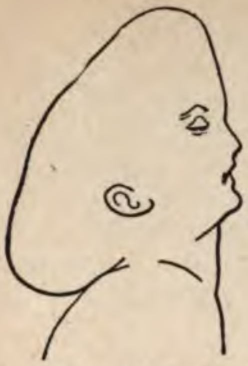


FIG. 269.—Form of the head after expulsion in brow presentation (Tarnier).

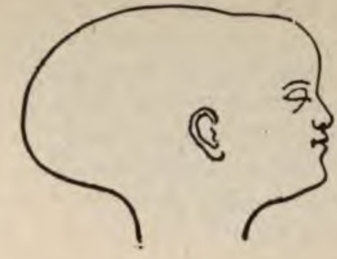


FIG. 270.—Form of the head after expulsion in face presentation (Saxinger).

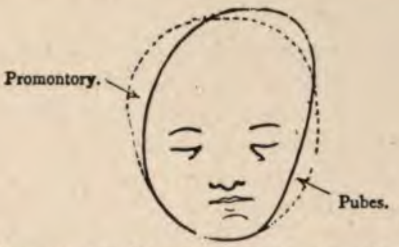


FIG. 271.—Deformation of the head expelled last.

Causes of accouchement.—We find in the production of accouchement two causes, *efficient and determinate.*

1. *Efficient causes.*—The fœtus is essentially passive during accouchement and the efficient cause of the birth of the child is uterine contraction aided by that of the abdomen. There have been some cases of spontaneous accouchement observed after the death of the mother, testifying simply to the persistence of uterine contraction after the cessation of life.

2. *Determinate causes.*—Why does the uterus enter into contraction at the end of nine months, the normal term of pregnancy? The fœtus, the membranes, and the uterus, have been in turn brought forward as causes.

a. Fœtus.—All impediments of fœtal physiology have been given as determining accouchement. Opinions formerly varied much on the source of these obstructions. I cite the principal ones: Distension of the intestine by meconium and of the bladder by the urine; insufficiency of circulation by progressive narrowing of the foramen ovale; obstruction to fœtal movements by the uterus becoming relatively too small.

It is possible that accouchement may have the fortunate effect of affording a remedy for these obstructions, but it cannot be conceived that they are capable of becoming the determinate cause of labor.

b. Membranes.—At term the degenerated decidua is separated from the uterus to quite a great extent. Thus the ovum forms a foreign body in the uterus and produces labor (Simpson). It is certain that every foreign body in contact with the internal surface of the uterus causes more or less severe contractions, but it is difficult to understand why, the separation of the ovum from the uterus being progressively made during the last three months and the detachment proceeding from the internal orifice toward the fundus, labor occurs exactly at the end of nine months and not at a more advanced period. Besides in pathological adhesions of the membranes labor would never occur.

c. Uterus.—The derminate cause has been sought, either in the circulation of the uterus or in the muscular tissue of the organ.

Circulation.—Two theories:

Theory of uterine asphyxia.—Like all the muscles of organic life, the uterus is very sensitive to the action of carbonic acid; now the stasis in the last period of pregnancy favors the accumulation of this gas, and to this Brown-Sequard attributes the production of labor. The principle of this explanation is true, but, this local asphyxia being progressive, it is difficult to comprehend how it becomes, just at normal term, sufficient to produce accouchement.

Theory of the tenth menstrual epoch.—Every month during pregnancy, at the time corresponding to the menstrual epoch, is produced a genital congestion which favors uterine contraction and exposes the woman to abortion. Tyler Smith advances the theory that the tenth menstrual period becomes the cause of labor. This theory cannot be admitted, for often the time of accouchement does not coincide with the tenth menstrual period.

Muscular fibre.—Two theories;

Theory of maturity of the uterine fibre.—Chaussier believes that the uterine fibres attain a maturity which renders them apt to contract energetically at the end of nine months. This is pure hypothesis.

Theory of the irritability of the uterine fibres.—Uterine irritability, latent during the course of pregnancy when it is only revealed by slight contractions, is manifested in all its energy at the term of gestation, awakened either by distention of the body of the uterus or by that of the cervix.

a. Distention of the body of the uterus.—This theory sustains that the uterus, like the rectum and the bladder, will contract when it is distended to the maximum and that accouchement thus takes place by a mechanism analogous to defecation and to micturition. Seductive at first glance, this is not satisfactory on attentive examination. For if accouchement took place by a similar mechanism, the moment of its defecation might vary, as the periods of micturition and defecation vary in different women, and take place at the seventh, eighth, ninth or tenth month. Besides the same woman may be delivered at term of a single fœtus or of two, and in the second case the uterus is much more distended than in the first. Finally in extra-uterine pregnancy a pseudo labor follows at term.

b. Distention of the cervix.—According to Levret, the cervix becoming effaced in the latter part of pregnancy, uterine contractions follow. But this theory cannot be admitted for often the cervix is only effaced during labor.

In *resume*, in all the preceding theories, we find influences which explain the appearance of labor but none of them explain why labor is regularly produced at the end of the ninth month.

Diagnosis of accouchement.—When a physician is called attend to a woman normally pregnant and suffering intermittent abdominal pains, he should always seek the solution of the following questions:

I. Is this woman in labor?

II. What is the presentation and the position of the fœtus?

I. *Diagnosis of labor.*—In a practical point of view it is the imminence of fœtal expulsion that we seek. We wish to know how soon the woman will be delivered and whether to remain or not, to assist at the moment of expulsion. Now there is no diagnostic point that is more exposed to error than this. An experienced accoucheur may decide that the woman will not be delivered soon and yet in an hour the child may be born. Again, he may assure the woman that she will be delivered in a few hours and yet at the end of twelve or twenty-four hours the accouchement has not advanced, and labor may even be postponed for two weeks or a month. These inevitable errors are due:

1. To the difficulty of exactly recognizing the beginning of labor.
2. To the rapidity, sometimes excessive, of the accouchement.
3. To the arrest and retrocession of labor.

Labor, according to some, commences with painful uterine contraction, but certain women are delivered without suffering, while others suffer all through the last month of pregnancy. According to others, who make labor synonymous with the opening of the cervix (effacement and dilatation), it begins with effacement of the cervix. This is certainly a valuable element, but in which we cannot fully confide, for some women have the cervix effaced in latter part of pregnancy without being in labor.

Labor, in fact, is the assemblage of acute modifications which are produced in the maternal organism to cause with a brief delay the birth of the child. It is necessary not to remove from the term *labor* its signification of approaching expulsion, as without this it loses all practical interest and falls into theoretical domain.

It is important to seek the elements on which we can base our diagnosis of labor. They are three in number:

Painful uterine contraction.
Opening of the cervix.
The show.

Uterine contractions only indicate labor when they are markedly painful. It is especially necessary not to confound with them other pains (vesical, intestinal, nephritic, hepatic colic) which may occur in the abdomen.

The opening of the cervix comprises effacement and dilatation of the external orifice. Now, when after effacement the dilatation has attained two fingers' breadth, or more, the diagnosis of labor is no longer doubtful. Two successive examinations with a quarter of an hour interval will be sufficient to show if the opening is progressive or stationary. If progressive, the diagnosis of labor can be made; if stationary, the diagnosis should be reserved. When several examinations of the cervix reveal no modification, we can conclude in cases where the uterine pains are nul or little energetic, and where the vagina presents but little show, the absence or arrest of labor.

The show, the flow of which indicates both the opening of the cervix uteri and the energy of the uterine contractions, is also a good sign of labor.

When these three signs are present the diagnosis of labor is easy. But one of them may be wanting; for example, the uterine contraction remaining painless or the cervical dilatation not progressing. In such cases we can still make a diagnosis of labor when the two existing signs are clear and characteristic. Finally two of these signs may be wanting, and a single one permit us to establish the diagnosis of labor; for example, the progressive dilatation of the cervix with the absence of pain or of the show. We can then say a woman is in labor when there is found:

1. Contractions of the uterus, markedly painful.
2. A progressive opening of the cervix (effacement or beginning dilatation), or with a cervix effaced and dilated at least to an extent equal to two fingers' breadth.
3. A sufficiently abundant and continued show.

II. *Diagnosis of the presentations and positions.*—The diagnosis of the presentation and position of the fœtus is made with the aid of palpation, of auscultation and of digital examination. Interrogation and inspection furnish us no knowledge of importance on these points.

We have already seen, apropos of pregnancy, how palpation and auscultation may lead to the diagnosis of the fœtal presentations and positions. We have also seen what information may be furnished by vaginal touch before the opening of the cervix, there only remains to study digital examination after the opening of the cervix.

Vaginal touch after the opening of the cervix.

1. *Vertex.*

a. Presentation.—Fœtal part, hard, rounded, even. Sutures and fontanelles—the lambda is nearer to the genital axis than the bregma. In the opposite condition, the presentation is that of the brow or tending toward it.

b. Position.—The position will be indicated by the sagittal suture, the lambda indicating the situation of the occiput.

c. Causes of error.

1. *Vices of ossification.*—The accessory fontanelle has only two sutures, terminating in it, and will not be confounded with the lambda which has three, nor with the bregma which has four.

2. The asteric fontanelle, in cases of inclination of the head may be mistaken for the lambda. The asteric fontanelle will be recognized by the projection of the asterion and the vicinity of the ear.

3. If a sero-sanguineous swelling prevents the perception of the details of the head, the ear will be sought and the direction of the occiput ascertained by exploring its pavilion.

4. In cases of cephalic malformation, manual examination will permit us to reach the face and even the trunk of the child.

2. *Face.*

a. Presentation.—Special sensations furnished by the mouth, the nose and the eyes.

b. Position.—The exploration of the preceding organs, when the chin cannot be reached, allows determination of the position.

c. Causes of error.

1. Confusion with the buttocks may take place when the cheeks are considerably swollen. Distinction by the presence of the facial organs around the groove.

2. *Confusion of the mouth with the anus.*—In the mouth are felt the maxillary alveoli, the tongue and the frænum of the tongue. From the anus the finger returns soiled with meconium.

3. *Brow.*

a. Presentation.—Characters analogous to those of the vertex (but with the lambda accessible with difficulty or not at all). The orbital arches, the eyes, and even the nose, may be reached.

b. Position.—After exploration of the bregma and the lambda or of the height of the face the situation of the head can be diagnosed.

c. Causes of error.—The same as for a vertex presentation.

4. *Breech.*

a. Presentation.—Complete breech—buttocks, feet, sacral crest, coccyx, anus, external genital organs. Incomplete breech—same characters minus the feet. Variety of the knees—two small cylinders, constituted by the two segments of the lower limb, meeting at an angle. Variety of the feet—only the feet can be felt. Manual touch alone allows the breech to be attained.

b. Position.—Whatever the variety of the presentation, the position can be clearly determined only when the anus and the coccyx or the sacral crest can be felt.

c. Causes of error.—I shall not return to those mentioned apropos of the face. Knees—confusion with the elbow, differentation by exploration of the contiguous parts in difficult cases. Foot—confusion with a hand, fingers larger than toes, thumb clearly separated from the fingers. In the foot, the contiguous malleoli are quite different from the wrist.

5. *Thorax.*

a. Presentation.—Characteristic costal region.

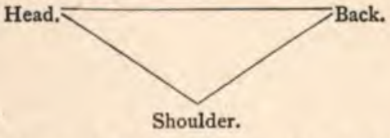
Dorsal variety—projections of the spinal apophyses.

Sternal variety—sternal quadrilateral interrupting the costal region.

Shoulder variety—projection of the shoulder and of the acromion, scapula on one side, clavicle on the other (the diagnosis of right and left shoulder will be made with that of the position).

b. Position.—In the dorsal and sternal varieties, the position can scarcely be recognized except by manual touch or by the aid of palpation, but most often this diagnosis is to be made in the shoulder variety. To recognize the presentation of the shoulder and its position we have recourse to three elements, of which two should be clearly determined. Presentation of the shoulder is like a triangle, of which two angles being known we can determine the third, and at the same time all the triangle.

These three elements are:



When the situation of the back and of the head is known, the shoulder which presents and the position of the fœtus can be determined. When the situation of the back and the shoulder which presents are known, the situation of the head can be determined. When the situation of the head and the shoulder which presents are known, the position of the back can be determined. It is evident that palpation will be a great help in the determination of these two elements.

c. Causes of error.

Procidence of a foot may lead to a confusion with a presentation of the breech. Attentive exploration will avoid this confusion. Procidence of a hand in another presentation than that of the shoulder may give rise to doubts only removed by a detailed examination.

6. *Abdomen.*

a. Presentation.—Characteristic softness of the abdomen.

Umbilical variety—insertion of the umbilical cord.

Variety of the flanks—contiguity of the costal region and of the iliac crest.

Variety of the lumbar regions—resisting part, with the projections of the spinal apophyses, dividing the soft tissues.

b. Position.—The diagnosis will be made in a manner analogous to that indicated for the thorax. The situation of the back and head will be determined by palpation and manual touch.

c. Causes of error.—The softness of the abdominal wall may create confusion with a thick bag of waters. The insertion of the cord and, at need, manual touch will avoid mistakes.

Duration of accouchement.—The duration of accouchement is quite variable; however, it can, outside of causes of dystocia, be fixed at twelve hours in the primipara and at six hours in the multipara. The period of the opening of the cervix occupies about five-sixths of this time and the expulsion one-sixth.

Previous deliveries give information on the rapidity for, all things being equal, the duration of accouchement remains proportionately equal in the same woman. Heredity also plays an interesting part, as the study of certain number of cases permits the formulation of the following: The duration of the accouchement is, in the absence of all causes of dystocia, analogous to that of the accouchement of the mother or of the paternal grandmother, according as the physical resemblance of the woman relates to her mother or to her father. Accouchement in obese females is generally longer than normal.

The question of the presumable duration of the accouchement is one of those so often asked of a physician during labor. The responses should be very circumspect, for the duration is exceedingly variable and errors are frequent.

Prognosis of accouchement.—The prognosis of accouchement for the mother and for the child depends upon such a multitude of conditions that it will be impossible to trace here more than a bare outline.

A. *Mother.*—The prognosis for the mother depends:

1. Upon the presentation and the position of the child. The more frequent a position, the better is its prognosis. With regard to the presentations of the cephalic ovoid the anterior positions are more favorable than the posterior, on account of greater facility of internal rotation.

2. Upon peculiarities of pregnancy or of accouchement. Twin pregnancy; hydramnios; viscous insertion of the placenta; laceration of the cervix, perinæum, etc., all complications, darken the prognosis.

3. The place in which the woman is delivered. Formerly, before the antiseptic period, the hospital was a deplorable place for accouchement. To-day puerperal mortality is less in the hospital than in the private houses.

4. Upon the person who assists at delivery. Numerous complications result simply from violation of antisepsis, from ignorance, and from too great haste in interventions.

B. *Child.*—The prognosis for the child depends:

1. Upon the presentation and the position.

a. Fœtal mortality according to the different presentations (outside all causes of dystosia, other than that caused by the presentation).

CEPHALIC OVOID.	CORMIC OVOID.
1. Vertex $\frac{1}{100}$	1. Breech $\frac{1}{10}$
2. Face $\frac{1}{20}$	2. Thorax $\frac{1}{2}$
3. Brow $\frac{1}{2}$	3. Abdomen ?

For each ovoid the order of increasing gravity is the following:

Presentation of the large extremity.
Presentation of the small extremity.
Presentation of the intermediate part.

b. Prognosis according to the variety of presentation and of position.

Vertex—The occipito-~~anterior~~ posterior positions are more grave than the anterior.

Face, Brow—The mento-posterior positions are also more grave than the anterior.

Breech—The incomplete breech, variety of the thighs, is of worse prognosis than the other varieties.

Thorax, Abdomen—The dorso-anterior positions are more favorable, when version is necessary, and the posterior, on the contrary when embryotomy is required.

2. Upon the volume and upon the number of fœtuses. The greater the volume of the child the more the chances of dystocia

increase. The more fœtuses in the uterine cavity, the more unfavorable becomes the prognosis for each one of them.

3. Upon the conformation of the woman.
4. Upon the complications of pregnancy and of accouchement.
5. Upon the person who assists at delivery as for the mother.

CHAPTER XII.

MANAGEMENT OF ACCOUCHEMENT.

1. **Management of accouchement in general.**—A. *Preparatory.*—All useless textures should be removed from the parturient chamber. The room should be heated to 18° C. and maintained at that temperature to avoid the chilling to which the woman is exposed.

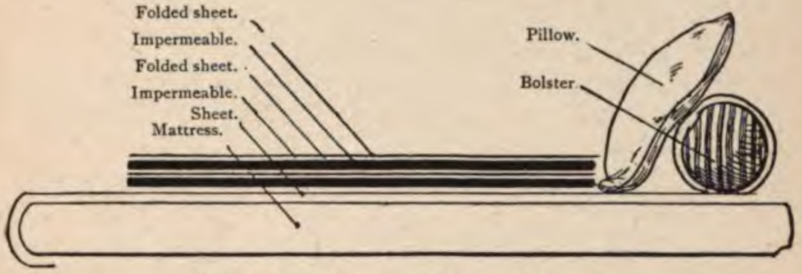


FIG. 272.—Bed prepared for accouchement.

In preparing the bed for an expected accouchement there is placed over the sheet covering the mattress (Fig. 272) an impermeable cloth (oil-cloth or rubber) having the width of the bed and a length of about one metre and a half. Above this is a sheet folded double, then another impermeable cloth and, finally, a sheet folded double as before. These sheets are fixed to the mattress by safety pins. The first portion, including the first impermeable cloth, is to be removed after delivery; the second is to be left during the post-partum.

A vaginal injector is indispensable. The most simple is the best. I use the injector represented by Fig. 273. A bed-pan is equally indispensable.

Absorbent cotton should be used in place of a sponge, and to apply to the vulva during the post-partum.

The armamentarium of the obstetrician should consist of forceps, uterine sound, needles and sutures, ordinary scissors, two bistouries, one pointed the other blunt, six hæmostatic forceps, obstetrical stethoscope, a speculum and a hypodermic syringe. It will be better to add a bottle of chloroform and one of a solution of ergotine, two rolls of iodoform gauze, two vulsela and a dressing forceps.

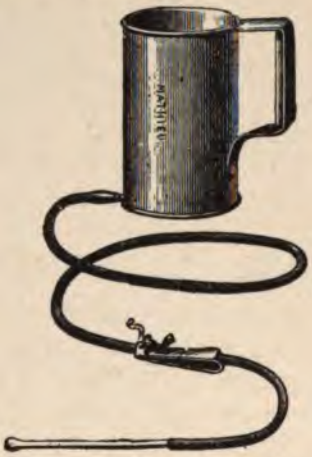


FIG. 273.—Vaginal irrigator of nickeled metal.

B. *Management of accouchement.*

Medicaments.—Fifteen days or a month before accouchement it is necessary to prepare the following medicaments:

1. Powders:

Mercury bichloride,	vi grs.
Acid Tartaric,	xvi grs.
Carmine of indigo $\frac{5}{100}$ solution,	ii gtts.

Ft. x powders. One powder to a litre.

2. Solution:

Acid phenic,	iv ℥
Alcohol or glycerine,	vi ℥
Essence of thyme,	lxxv gtts.

A tablespoonful of this solution to a quart of water gives a phenic acid solution of $\frac{1}{100}$; two tablespoonfuls, a solution of $\frac{1}{50}$. Before accouchement lavage should be made with the bichloride of mercury solution $\frac{1}{2000}$; after accouchement with the phenic acid solution $\frac{1}{100}$.

The lavages preceding accouchement are much more important than those given afterward. At that time all the genital surface has been bruised and the absorption of the infectious element has already been made. All solutions should be made of filtered or boiled water.

3. Borated vaseline, 4 to 100.

4. Ergot or ergotine.

5. Chloroform. For anæsthesia or where there is fear of complication.

6. Ether. For subcutaneous injection in case of syncope, and abundant hæmorrhage.

7. Solution of the chlorohydrate of cocaine $\frac{1}{20}$. For application to the vulva during expulsion, or after accouchement to calm the pains caused by the vulvar distention and the numerous injuries to its surface.

Period of dilatation of the cervix.—At the beginning of labor an enema should be given to have the rectum empty during the period of expulsion. Every three or four hours the vulva should be washed and this should be followed by a vaginal injection (bichloride of mercury, 1–4000), taking care during the first injection to make as complete lavage as possible by rubbing the vaginal and cervical walls with the fingers, or better, by using the finger irrigator (Fig. 274). This genital toilet should be made by the physician for on the asepsis of the genital organs depends the normal progress of the post-partum.

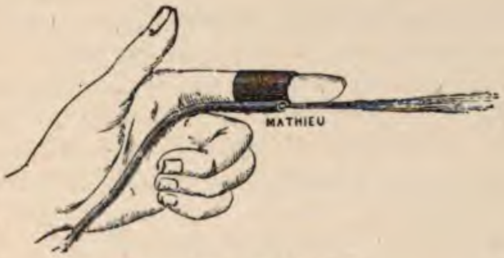


FIG. 274.—Finger irrigator.

The distention of the bladder will be watched, and when micturition is impossible catheterism will be necessary.

During this period of dilatation of the cervix the patient may move about at will (except in certain special conditions which necessitate a horizontal decubitus).

Period of expulsion.—During the close of the period of dilatation, and especially during the period of expulsion, it is important to auscultate the sounds of the fœtal heart, to be in readiness to intervene if their exaggerated frequence or their slowness causes fear for the life of the child. From the moment of complete dilatation the woman should remain in bed, in the position that is agreeable to her.

As soon as the head appears at the vulva (primipara) or in its vicinity (multipara), the woman will be placed in the lateral position or the dorsal position. The buttocks are raised (Fig. 275) the thighs flexed and separated. Two persons give each a hand to the patient to afford a support in her efforts. The accoucheur sustains the perinæum and watches the exit of the child, which should be as slow as possible.* The head, or in a general manner the fœtal part, should be brought through the vulvar orifice in the interval between two contractions. At this moment the patient should be instructed not to bear down, in spite of the imperious need she feels, or to bear down in the interval of the uterine contractions

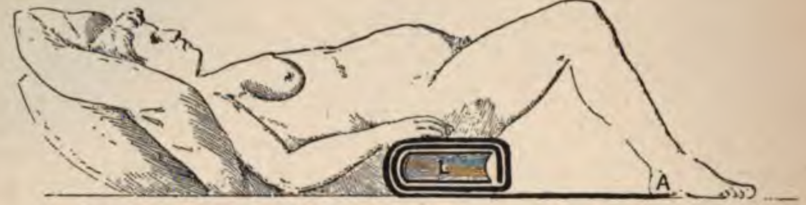


FIG. 275.—Buttocks raised to facilitate expulsion. L, book; A, sheet wrapped round the book and corresponding by its free end with the feet of the woman.

Generally at the moment the anus dilates the woman feels the need of defecation and sometimes demands permission to get up. The physician should refuse this, explaining at the same time that it is only a false call of nature and the result would be nul.

Ligature of the cord and delivery of the appendages.—After the birth of the child it is necessary to tie and to cut the cord and to proceed to the delivery of the after-birth. The management of the latter will be considered in the study of the last stage of accouchement; here we will simply attend to the ligature of the cord and the care consecutive to delivery.

Ligature of the cord.—Is it necessary to tie the cord? How should the cord be tied? Where should it be tied? When should it be tied?

Is it necessary to tie the cord? Animals, like the cats, for example, bite off the cords of their little ones. In the human species many accoucheurs have tried simple cutting of the cord without ligating, and have not found hæmorrhage from the fœtal end to follow. It would seem, therefore, at first glance as if the ligature was unnecessary. But if there were no untoward result in the majority of cases; in some, particularly when the respiration is not well established, serious, sometimes fatal hæmorrhage has followed. These hæmorrhages occur even when the cord has been tied, as in the case reported by Dubois, of one of his patients, where the child, born alive, died about three hours after birth, and he found an immense clot, originating from the cord, which covered the abdomen. To avoid these accidents it is, therefore, always advisable to carefully ligate the cord, in spite of its uselessness in many cases.

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* The slowness with which the head is disengaged is the key to the maternal integrity.

These remarks apply only to the question of ligating the fœtal end of the cord ; as far as that of the maternal end is concerned it is only necessary in the case of twins, for with a simple pregnancy, the fœtal circulation does not communicate directly with the maternal, the opening of the funicular vessels does not have any serious consequences. I have, nevertheless, the habit of tying the maternal end, not on account of hæmorrhage, but to have in the ligature, made at level of the vulva, an index of the separation and descent of the placenta.

How should the cord be tied? With an ordinary coarse thread, wrapped around the cord ; with a twisted thread of fine silk. In the case of a gelatinous cord it is advised by some authors to employ an elastic thread, which is wrapped about the cord with the aid of a match or slip of wood placed lengthways of the cord and which is removed by breaking in the middle and withdrawing the pieces.

In place of this ligature, which necessitates an elastic thread, which is rarely at the disposition of the accoucheur, I prefer to tie the cord in two parts by passing through the centre of the cord a large needle threaded with the ligature (Fig. 279 *a*, *b*, *c*). If the hæmorrhage continues after this ligature the ends of the vessels should be denuded of the tissues covering them and separately tied.

Where should the cord be tied? Make a ligature about 4 centimetres, 1⅗ in., from the umbilicus (ligature of the fœtal end and a second ligature at the edge of the vulva, ligature of the maternal end). Cut the cord about two-fifths of an inch from the fœtal ligature and consequently five centimetres, two inches, from the umbilicus. It is advised not to place the ligature nearer to the umbilicus on account of possible hernia of the intestines and also on account of having place to tie a second ligature, if one should be necessary.

When should the cord be tied? Ligature of the cord may be:

Immediate. That is, immediately after birth.

Delayed. Some minutes after expulsion, when the pulsations of the cord, of which the cessation is gradual, have ceased five to ten minutes after birth.

Retarded. After deliverance of the placenta, method exclusively employed in royal families, where the ambassadors formerly assisted at the immediate ligature to establish the identity of the child. This formality has been replaced by the retarded ligature, made in their presence away from the mother.

M. Budin has studied the relative advantages of the immediate and delayed ligature. He found that for some minutes following birth, a quantity of blood (about 100 grammes) passed from the placenta to the fœtus. He has proved, with M. Ribemont, that the diminution of the initial weight of new-born children is less marked where the ligature is delayed and that the increase of weight at the tenth day is more considerable. The later researches of Helot, Hayem, Cuzzi, have equally demonstrated the incontestible value of delayed ligation.

It is, therefore, after the complete cessation of the pulsation of the vessels that the cord should be ligated and cut.

Dressing the cord. A small piece of fine linen should be used to envelop it; it should be simply covered with borated vaseline and changed every day. Keep it in position with a band of linen around the abdomen with a flannel bandage above it. Dry dressings are bad, because the funicular cord in drying becomes hard and uncomfortable; dressings with an antiseptic solution, sublimate, or phenic acid, are also bad, for they retard the falling off of the cord. Want of care in dressing the cord exposes the child to erysipelas of the umbilicus and to umbilical phlebitis, with the possibility of grave consequences. After the falling off of the cord, it is advisable to continue for two or three months the umbilical band to prevent hernia of the umbilicus.

Care consecutive to delivery.—Proceed at once to the toilet of the woman with a carbolic solution, 1–50. A simple vulvar lavage is sufficient in normal cases, and when the care previously indicated has been taken during accouchement. If not, a vaginal injection, and an intra-uterine injection, if needed, will be given. Perineorrhaphy is performed if necessary. At this moment it is necessary to watch the condition of the uterus by palpation on account of the frequency of hæmorrhage. The physician should not leave the parturient woman for an hour or more after delivery and before leaving he should be well assured that the uterus is well contracted by grasping it through the abdominal wall.

Management of each position in particular.—A. *Presentation of the vertex.*—*Internal rotation.*—In the case of a posterior position the rotation of the occiput may occur late and impede the progress of labor. It should be aided when there exist complete dilatation and pronounced flexion of the cephalic ovoid, and when the vertex is supported by the perinæum. If one of these conditions does not exist it will be well to wait. The internal rotation may be aided with the fingers, the vectis, or the forceps.

Fingers.—Gliding two fingers in front of the sacrum to push the posterior parietal protuberance forward, or two fingers behind the pubes to push the brow backward.

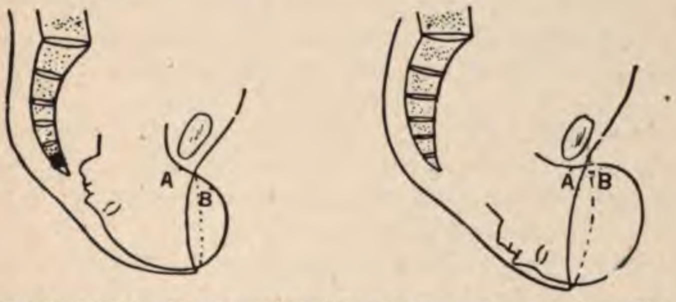
Vectis.—The vectis is not much used at present. This is a mistake, for in some cases, notably the ones now under consideration, it is capable of actual service. Slipped in behind the union of the occiput and parietal bones it accentuates flexion and causes rotation by the pressure it permits from behind forward.

Forceps.—The forceps should only be employed when the preceding means have failed and when there is no hope of seeing spontaneous delivery. In the study of this instrument we shall see its application.

Disengagement of the head.—It is necessary to use care, in aiding extension of the head during its exit through the vulva, to have the occipito-cervical groove in contact with the lower part of the pubes (Figs. 276–277). Without this, disengagement is unfavorable (Figs. 278–279).

In cases of uterine inertia, the disengagement of the head will be delayed. It will then be aided by the use of the fingers or of the forceps.

Fingers.—When the head is sufficiently advanced in the vulvar orifice, two fingers in the rectum can hook down the chin and favor cephalic extension.



FIGS. 276 and 277.—Disengagement of the suboccipito diameters (favorable).

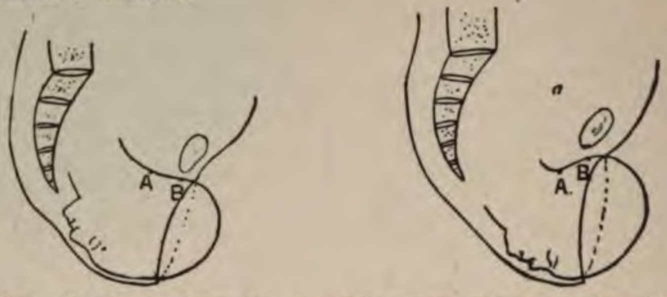
Forceps.—The employment of the forceps will be justified and indicated in the three following conditions:

1. *Maternal danger.*—Syncope; eclampsia; hæmorrhage; excessive fatigue; elevation of temperature to 39°–40° C.

2. *Fœtal danger.*—Acceleration or notable retardation of the heart sounds.

3. *Arrest of accouchement.*—Caused either by uterine inertia or by excessive resistance of the perinæum. The application of the forceps is authorized when, during the period of expulsion, the head

has remained two hours at the same point of the parturient canal. A compression of the same point of the maternal tissues for more than two hours exposes to gangrene and consecutive fistulæ.



FIGS. 278 and 279.—Disengagement of the occipito diameters (unfavorable).

Immediately on exit of the head care must be taken to wipe away from the child's mouth the mucus which may penetrate into the respiratory passages. Finally, the finger takes note if the cord is around the neck. If so, it is disengaged by passing it above the head or by gliding it over the shoulder, or finally, if it is too tightly compressed, by cutting it between two ligatures, or if time presses, without any hæmostatic precaution.

Disengagement of the trunk.—The head should be sustained immediately after its exit. If the disengagement is tardy the women is asked to bear down while the head is drawn upward to favor a normal exit, posterior shoulder first, then the anterior. If this fail, the head is then lowered to disengage the anterior shoulder first. The rest of the trunk is delivered without difficulty by drawing slightly on the body, one hand still supporting the perinæum.

B. *Presentation of the face.—Period of dilatation of the cervix.*—I believe the different means advised for converting a face into a vertex are seldom indicated when the face presentation is marked or when the head is completely extended.

Period of expulsion.—The rotation of the chin forward in the mento-posterior positions being obligatory, it is necessary to bring it forward at any price.

Disengagement.—When the mento-cervical groove is under the pubes the flexion of the head should be favored. The other indications are the same as for the vertex.

C. *Presentation of the brow.*—Before dilatation is complete the endeavor should be made to transform the brow into a face or vertex presentation by the use of internal, external, or combined manœuvres, or with the aid of the lever. Before entering upon the manœuvre the question presents itself as to which would be more easily accomplished, the transformation into the vertex or face presentation. The vertex, being the most common presentation, its superiority cannot be doubted; but it is not always easy to obtain it, so that it is sometimes necessary to accept the transformation into the face presentation as the best that can be done. The transformation is sometimes by internal, sometimes by external manipulation, sometimes by the two combined.

Internal. Baudelocque was the first to advise, in the case of want of cephalic flexing, the placing of one or more fingers about the occiput and thus favor the descent of the head. Mme. Lachapelle had recourse to the same manœuvre; but when she failed to bring down the head she reversed the method and, drawing down the chin, would thus deflect the head. These two proceedings of Baudelocque, flexion, and of Mme. Lachapelle, deflexion, cover the most of the methods since employed. If, in place of drawing down the occiput or the chin, these same parts are pressed against, the result has been identically the same although inverse. It is not necessary that the membranes should be broken to execute these movements; nevertheless, it is necessary to understand that they compromise the integrity of the ovum.

Exteriorly. Schatz, in 1873, after a profound study of the action which the accoucheur may be able to exert upon the fœtus through the abdominal walls, formulated a new method of changing a face into a vertex presentation. The same method is applicable to the brow. It consists in lifting up the fœtus and grasping it through the abdomen and uterus at the presumed level of the shoulders, while an assistant, by vigorous pressure in the direction of the occiput, endeavors to flex the head. This manœuvre is ingenious, but requires great ability and is seldom employed.

Combined manipulation. One hand, introduced into the interior of the uterus, is pressed against the chin or the occiput, according to the result to be obtained, while the other, applied immediately upon the exterior on the fœtal head presses upon the part it is desired to have descend.

In place of manual reduction, the attempt may be made with the aid of an instrument known as a vectis. The blade is glided over the occiput of the fœtus (sometimes with a different purpose upon the side of the head) and by traction, combined with a rocking motion, the occiput is brought down and the head flexed. The vectis acts in the same manner as the fingers in the manœuvre of Baudelocque, but with the advantage of occupying less space and that it may be used with a lesser degree of dilatation.

When dilatation is complete the methods described may be equally employed, and also in addition: version, forceps, and embryotomy. Version, first practised by Mme. Lachapelle, causes, like the preceding methods, a transformation of the presentation, the brow is changed into a breech. The cephalic ovoid is removed to bring down the cormic ovoid.

Podalic version by internal manipulation may be followed by extraction, as is the general practice in France, or, on the contrary, left to be completed by the maternal forces, as is recommended by some German authors.

The forceps applied at the superior strait, on a brow presentation, may seize the head with or without previous reduction. Previous reduction consists in changing, by the means previously indicated, the presentation into that of the vertex or face. When the head is taken in a brow presentation, the blade will sometimes be applied from one parietal eminence to the other, sometimes from the chin to the occiput, sometimes from the parietal eminence upon one side to the maxillary process upon the other (see chapter upon forceps). In cases where none of these means succeed recourse must be had to embryotomy.

When dilatation is complete, the head being always at the superior strait, the same methods may be employed, but the farther labor has progressed the more difficult version, as well as the transformation of the presentation, becomes.

B. The head is in the pelvis or at the inferior strait. When the head has entered the pelvis, and is more or less advanced toward the inferior strait, a new element, which plays a very important part, appears: the deformation of the cephalic ovoid. With this change of form, the transformation of the brow into a vertex or face presentation becomes very difficult and can only be obtained when it is possible to cause the head to recede. It is this deformity more than the dimension of the occipito-mental diameter, which becomes an obstacle to the rocking motion of the head and to the movements of flexion and extension. With the descent of the head into the pelvis, it is no longer a question of version, which will be useless and dangerous, involving the danger of rupturing the uterus. There remains, therefore, only the forceps, and in cases where this instrument is insufficient, embryotomy, which may bring about the termination of the accouchement.

C. The head is in the soft pelvis. The inferior strait has been passed, the head depresses the perinæum, and little by little traces out a road in the direction of the vulva. Transformation of the presentation into that of the face or vertex is useless ; version can no longer be made ; besides the soft parts oppose only a relatively feeble resistance, which the forceps will always overcome with or without injuring the integrity of the perinæum. The forceps are applied as in vertex presentations from one ear to the other.

Having considered the methods of intervention, two questions now present : When is it necessary to intervene ? How should intervention be made ?

The facility with which intervention can be made plays an important part in the selection of the proper time to intervene. If a manual reduction is easily made at the beginning of labor ; if the thinness of the abdominal wall and the complaisance of the uterus of the mother readily permits of the manœuvre of Schatz or of mixed manipulation, the accoucheur will be reprehensible if he does not act as promptly as possible, to transform the dystochia into eutochia. On the contrary, in cases where reduction is difficult, it is proper to wait for complete dilatation. But to delay longer, in the hope that nature will correct the bad presentation, appears to me to be imprudent and contrary to the interest of the parturient as well as that of the infant. One is exposed, to see the head descend into the pelvis with the brow presenting, and from that time transformation becomes difficult, if not impossible. In waiting, precious time is often lost and less favorable conditions for intervention come on. In conclusion it may be said : Intervene early, when it is possible, without waiting for complete dilatation, for a longer delay may be prejudicial.

How intervention should be made. When the head is in the soft pelvis, if the forces of the mother cannot terminate the labor, the application of the forceps will deliver the child. If the head is in the pelvis or at the inferior strait, it is also to the forceps that it is necessary to have recourse, with embryotomy as a last resort. To attempt, at this period of accouchement, the transformation into the vertex or face presentation is almost useless ; the head is small or has but recently descended and has not yet had the time to become deformed. When the head has been grasped with the forceps traction should be made to bring the great diameter of the head in the line of the great diameter of the genital passage. When the head is at the superior strait before dilatation is complete, if the pouch of water is still intact, internal manipulation, the manœuvre of Schatz, or combined manipulation may be attempted.

The position of the woman is of very great importance. It is necessary to place the patient in such a manner that the weight of the infant's spine will be toward the uterine wall, while the aid of a bandage and of tampons, or of an appropriate girdle, will press in a contrary direction upon the occiput and the breech.

When these attempts have failed, or when one has been called too late, and it is necessary to attempt intervention when dilatation is complete, the methods mentioned may be employed or recourse may be had to version or to the forceps. It is difficult to pronounce categorically between version and the forceps. The parallel established between these two operations long since is far from being settled, and it would be temeritous to attempt it here.

It would appear, nevertheless, that with the membranes still unbroken, a supple uterus, a head still mobile, a normal pelvis, or one little retracted, version is preferable. In opposite conditions the forceps should be used, the head grasped with or without previous reduction, according to the usual method.

Embryotomy remains as the last resort: In case of the death of the infant it should be used immediately to avoid compromising uselessly the safety of the mother ?

D. *Presentation of the breech.*—During pregnancy cephalic version by external manipulation should be made whenever possible, and the new position maintained by the aid of an appropriate girdle or bandage. The best time for intervention is fifteen days before term with multiparæ and a month with primiparæ. To act sooner is not giving nature the opportunity of correcting the presentation, which it often does, and to wait longer is to take the risk of being surprised by an accouchement with vicious presentation.

The management of delivery varies according as the breech is incomplete, thigh variety, or presents one of the three other varieties.

1. *Breech, complete and incomplete (knees and feet).*—The management is the same in these three varieties.

Period of dilatation of the cervix.—In some cases cephalic version may be attempted by external manœuvres before rupture of the bag of waters, and after rupture the same version by mixed manœuvres.

The woman should remain recumbent during the period of dilatation of the cervix to avoid, as much as possible, rupture of the membrane and a too sudden escape of liquid.

Period of expulsion.—Three points dominate and sum up the conduct of the physician during this period: 1. To place the woman in the obstetrical position. 2. Never to interfere, except in complications, during the exit of the cormic ovoid. 3. Always, or almost always, to interfere during the exit of the cephalic ovoid.

a. To place the woman in the obstetrical position, that is, across the bed, the legs sustained by the assistants, or each foot supported on a chair. This position will be prescribed when the breech arrives at the vulva.

b. Never to interfere, except in complications, during the exit of the cormic ovoid. To draw on a limb or foot is so easy and so tempting in the desire to assist the woman, but it is deplorable practice. It is sufficient to sustain the trunk, to avoid dragging on the cord and to watch the direction of the back.

c. Always, or almost always, to interfere during the exit of the cephalic ovoid. When the trunk has been expelled, and the head still remains in the maternal genital organs, the funicular circulation is interrupted by the compression of the cord between the maternal wall and the fœtal part. Thus it is of importance to extract the head promptly. This will be done with two fingers in the mouth, the other hand grasping the fœtal neck. The chin is carried backward and the hinge movement is simulated with the hands, as in the normal mechanism of delivery of the breech. In some cases the forceps will be necessary. Embryotomy will be useful only in cases of disproportion between the fœtus and the parturient canal.

2. *Incomplete breech, thigh variety.*—What has been said with regard to the preceding varieties equally applies here, except that there are some new considerations on the subject of extraction of the trunk. When the lower limbs are extended the obstetrician finds difficulty in the delivery because in extraction there is no available part of the fœtus to be grasped. To avoid this it has been proposed to draw down on both lower limbs by a hand introduced into the uterus before engagement, or even after if the fœtus can still be pushed up. When this is impossible three methods of extraction remain, the blunt hook, the fillet, and the forceps.

The blunt hook.—The finger introduced into the fold of the groin and curved like a hook may serve for the extraction of the breech. It is the best of blunt hooks and less dangerous than the numerous instruments of this form that have been advised.

The fillet consists of a cord passed around one of the thighs of the fœtus to serve for traction. Any inoffensive and soft substance will answer. It is passed by the aid of the fingers or, better, by the use of a hook intended for this special purpose (Fig. 280). The tractions are made during the utero-abdominal contractions.

The forceps are applied over the trochanters to grasp the bitrochanteric diameter as firmly as possible.

FIG. 279 *a.*

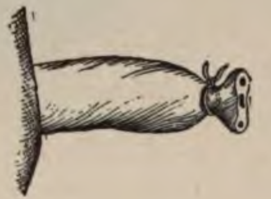


FIG. 279 *b.*

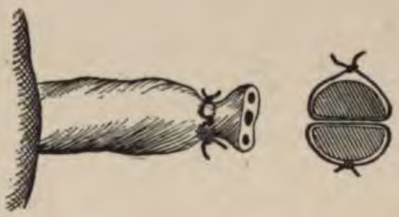
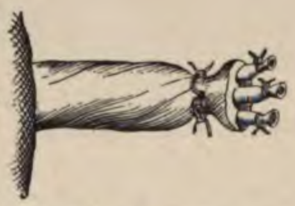


FIG. 279 *c.*



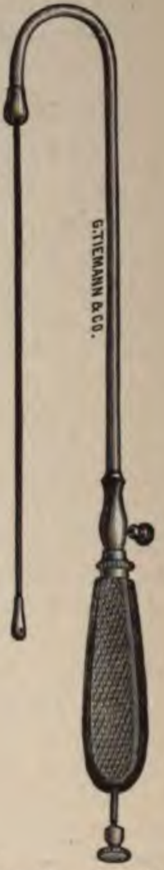


FIG. 279 *a.*—Single ligature. FIG. 279 *b.*—Double ligature. FIG. 279 *c.*—Double ligature with ligature of each vessel separately.

FIG. 280.—The fillet.

E. *Presentation of the thorax.*—During the period of dilatation of the cervix, if the membranes are intact, cephalic version will be attempted by external manœuvres, or if the membranes are ruptured, this is performed by mixed procedures.

Period of expulsion.—Immediately after complete dilatation, podalic version by internal manœuvres should always be performed, no account being taken of the chances of spontaneous evolution except in abortion. In cases where this intervention is impossible embryotomy is indicated.

F. *Presentation of the abdomen* requires the same management as that of the thorax, with the difference that if embryotomy becomes necessary it is not section of the neck that is made but evisceration.

CHAPTER XIII.

ACCOUCHEMENT.—DELIVERY OF THE APPENDAGES.

Delivery of the fœtal appendages may be normal (physiological) or abnormal (pathological). These terms define themselves. I shall only study here the physiological delivery, the pathological being reserved for later discussion. In the point of view of intervention delivery is called:

Spontaneous or natural, when it is left to the forces of nature alone;

Favored, when, by expression or by traction, the exit of the appendages is aided;

Artificial, when, to obtain the appendages, it is necessary to introduce the hand or instruments into the uterine cavity.

A. Mechanism.—Delivery takes place in three stages:

FIRST STAGE.—*Detachment of the appendages.*—The placenta, detached by a mechanism to be studied later, falls on the uterine circle which at this moment represents the internal orifice of the uterus.

SECOND STAGE.—*Uterine expulsion.*—The placenta is expelled from the uterine cavity into the vagina by passing through the portion extending from the uterine circle to the external orifice, representing the engagement of the placenta.

THIRD STAGE.—*Vaginal expulsion.*—The placenta is pushed out of the vagina through the vulvar orifice, representing disengagement of the placenta.

FIRST STAGE.—*Detachment of the placenta.*—Two theories have been advanced to explain this detachment:

a. Detachment by effusion of blood (Baudelocque).—The blood breaking up the attachments uniting the placenta to the uterus, is effused between these two organs, and, its quantity progressively increasing, mechanically separates the placenta and the membranes from the uterus (Fig. 281). In this theory the uterine muscular structure plays an almost passive part.

b. Muscular theory (Matthews Duncan).—Contrary to the preceding theory, the muscular structure here plays the principal role; it is the retraction and contraction of the organ, which, progressively diminishing the uterine cavity, pushes the placenta outward. Effusion of blood may exist but it plays only a secondary role. According to Baudelocque, the hæmorrhage is inevitable and indispensable; according to Duncan, it is accessory and may be absent (Fig. 282).

If Baudelocque's theory were exact, it should apply to all cases. But it cannot be accepted in placenta prævia, and besides the hæmorrhage of delivery of the appendages is often so slight that it could not be called upon to explain the placental detachment. On the contrary, Duncan's theory presents no exceptions and should be considered as well founded. It is the action of the uterine muscular structure which causes the detachment of the placenta and of the membranes.

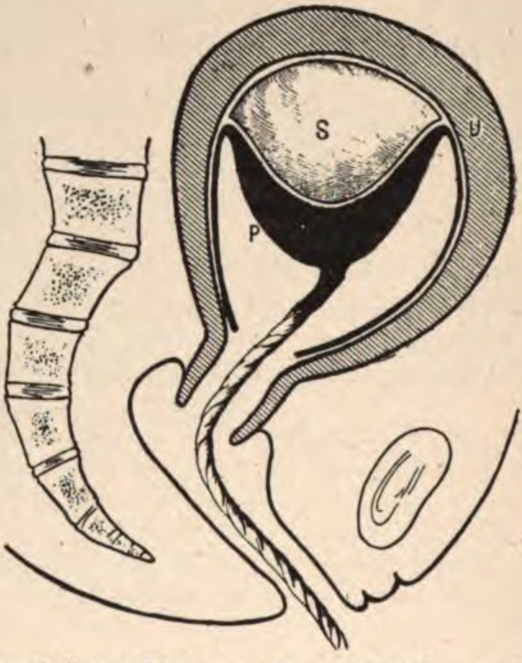


FIG. 281.—Delivery.—First stage. Theory of Baudelocque. S. blood; U, uterus; P, placenta.

SECOND STAGE.—*Uterine expulsion.*—The detached placenta falls on the uterine circle, where it may present in three different ways, by its uterine surface, by its edge, or by its fœtal surface

Presentation of the uterine surface (Fig. 283) takes place in about five cases out of one hundred. The placenta covers the uterine circle as if it had been originally inserted on the contour of this orifice. This presentation is the most rare and can be considered as pathological. It is usually due to a vicious insertion of the placenta or to partial adhesions of the placenta or of the membranes.

Marginal presentation (Fig. 284) takes place in about twenty cases out of one hundred. The edge of the placenta engages in the uterine circle, and arrives first in the vagina. The causes are analogous to those of presentation of the uteri surface:

Presentation of the fœtal surface (Fig. 285) occurs in seventy-five cases out of one hundred. This presentation of the placenta should be considered as the rule, or rather, as physiological, the others being pathological. It is to the placenta what the vertex presentation is to the fœtus.

The general disposition of the placenta is that of a cup, which is adapted to the uterus, to the contour of the uterine circle, and which is continued by the cord through the vagina and vulva to the exterior. The placenta, pushed by the uterine retraction and contraction, opens the uterine circle little by little and also the canal which follows it, drawing down the membranes which turn around it in proportion to its descent. Tractions on the cord and expression complete the detachment of the membranes commenced by uterine contraction. Matthews Duncan believes that the uterine canal should present a diameter of about five centimetres to allow the passage of the placenta.

THIRD STAGE.—*Vaginal expulsion.*—When the placenta has fallen into the vagina completely the woman feels a vague need of pushing. Under the influence of some efforts of expulsion the placenta progresses toward the vulva, appears at this orifice and finally passes it, drawing in its train the membranes. As at the uterine orifice the placenta may present by its uterine or by its fœtal surface or by its edge. In general the presentation is the same at both orifices, unless changed by interventions, as tractions on the cord. When the placenta presents at the vulvar orifice by its fœtal surface, the membranes are inverted and the ovum offers an inverse disposition to that which existed in the uterine cavity. When, on the contrary, there is a marginal presentation or a presentation of the uterine surface, the membranes are not inverted and preserve their primitive disposition.

B. Symptoms and diagnosis.—To recognize the different stages of the delivery, either touch or vision may be used, following the descent of the cord. Three circumstances may present:

1. The exploring finger meets the placenta in the vagina. The second stage is terminated and the third is in progress.

2. The placenta is at the level of the uterine circle, or engaged in the canal which follows it. The first stage is accomplished and the second is in progress.

3. The finger, as far as it can reach along the cord, cannot feel the placental mass. Detachment has not taken place and the first stage is in progress.

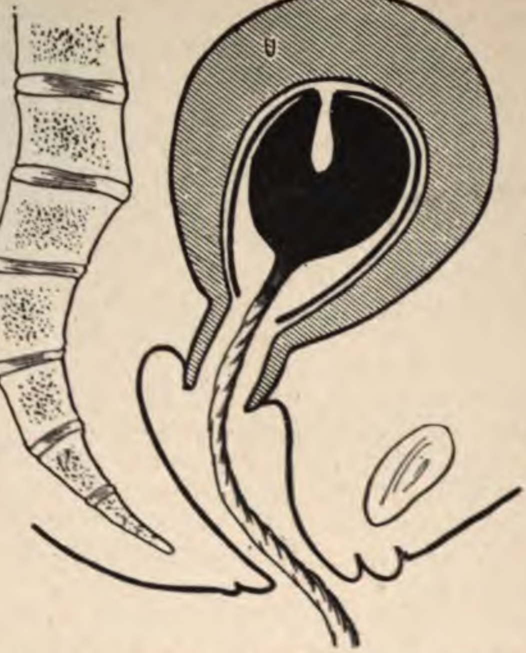


FIG. 282.—Delivery.—First stage. Theory of Matthews Duncan. U, uterus.

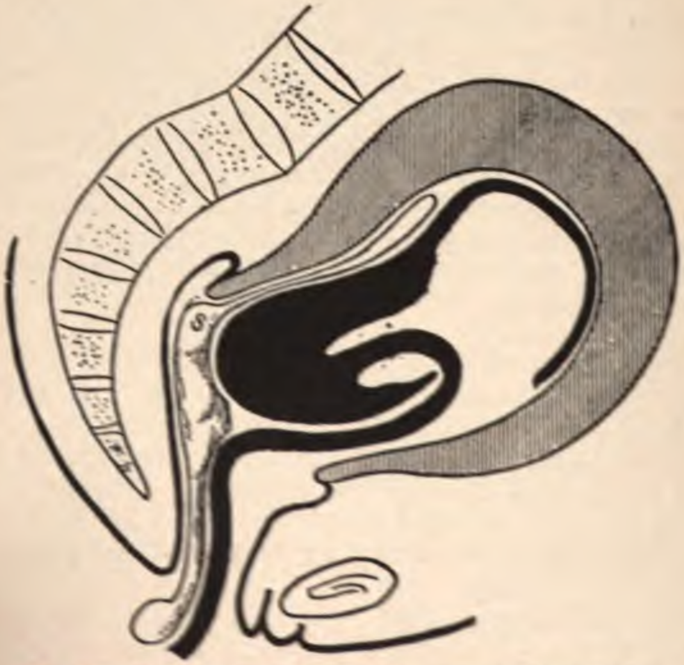


FIG. 283.—Delivery.—Second stage. Presentation of the uterine face.

Digital examination, then, gives exact information, but it presents a double inconvenience; the first, of being painful, and the second of exposing to septicæmia. Thus it is better, except in necessity, to be content with the examination of the cord.

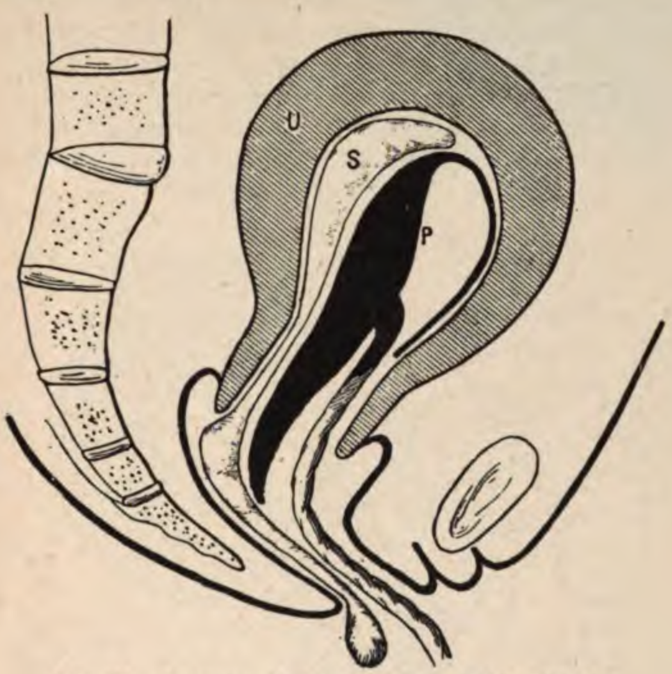


FIG. 284.—Delivery.—Second stage. Marginal presentation.
U, uterus; S, blood; P, placenta.

Examination of the cord.—At the same time that ligature is placed on the cord near the umbilicus, a second one should be placed at the vulva, as a funicular index permitting the descent of the placenta to be followed. When this index is at seven fingers' breadth below the vulva, the placenta is, in general, at the uterine circle and even engaged in that orifice. When it is still further from the vulva, the placenta is in the vagina, the second stage is accomplished and the woman feels at this moment a local *malaise*, which excites bearing down.

By this means one can, without digital examination, diagnosticate with sufficient precision the descent of the placenta. Touch should only be resorted to when delivery of the placenta does not occur at the end of an hour after accouchement, for then a pathological state is entered and the physician is authorized to seek the cause of this delay.

Duration.—Physiological delivery of the placenta lasts from some minutes to an hour, average of half an hour. A delivery lasting more than an hour is pathological.

C. Management of delivery of the placenta.—Four methods: Expectation; traction: expression; mixed method.

Method of expectation.—To leave nature to act, when all is physiological, is a counsel seductive in appearance. But is it so in practice? Must the physician wait near his patient several hours until delivery is terminated? The interest of the woman, above all, is responded. But the interest of the woman is not our waiting. It is bad practice, on the contrary, not to deliver the patient as soon as possible, to be enabled to change her, to give her dry clothes, and to permit repose. Thus simple expectation is, in general, abandoned and has few chances of making new proselytes.

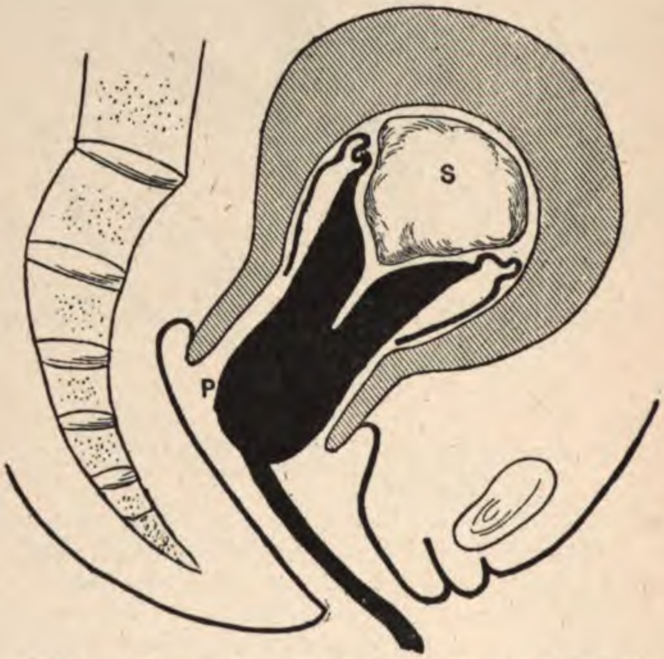


FIG. 285.—Delivery.—Second stage. Presentation of the fœtal face. S, blood: P, placenta.

Method of traction.—The principle of this method consists in aiding the exit of the ovuline appendages by tractions exerted on the cord (Fig. 286). The third stage is the moment of choice for this traction. The cord should be seized with a dry cloth and drawn gently outward. When the placenta opens the vulvar orifice it is grasped with the free hand and carefully delivered with the membranes.

Method of expression.—To replace the *vis a fronte* by the *vis a tergo* has been the idea from which this method arose. In the place of drawing, it is thought preferable to push (Fig. 287). Crede's name is generally attached to this method. The cord is no longer to be touched. After the exit of the fœtus, almost at once (Winckel), or at the end of a certain time, when uterine contraction returns (Breisky), the uterus is grasped with the whole hand and squeezed like a sponge. By this expression uterine retraction and contraction are aided, diminishing the capacity of the uterus and obliging the contents to escape. Pressure on the hypogastrium, combined with that on the uterus, is sufficient to favor evacuation of the vagina.

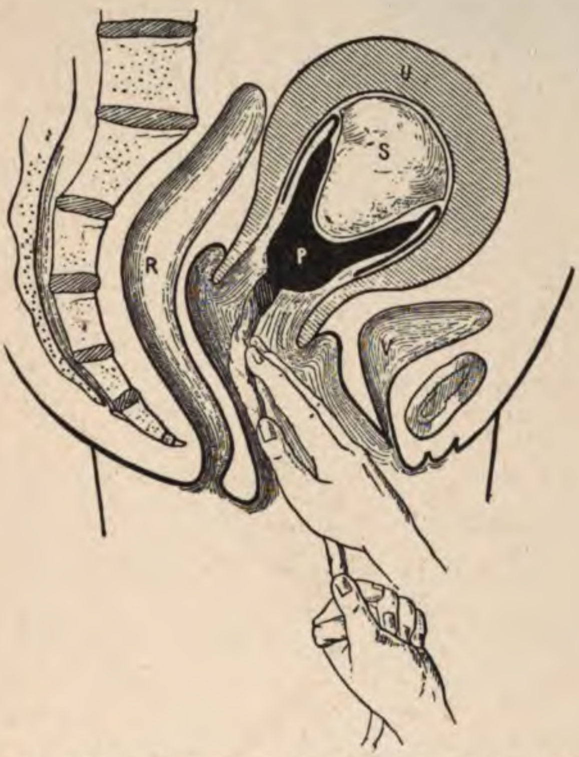


FIG. 286.—Delivery by traction. U, uterus; S, blood; P, placenta; R, rectum; V, bladder.

Mixed method.—It is to this method that I give the preference, for it unites the advantages of expression and of traction (Fig. 288).

This method should be practiced as follows: During the first stage of the delivery, while the funicular ligature has not descended to seven fingers' breadth below the vulvar orifice, it is sufficient to place one hand on the fundus of the uterus, to assure the progressive retraction of the organ and to aid it by slight frictions. When the first stage is terminated, after having grasped the cord with one hand make gentle tractions in the direction of the perinæum, while the other hand expresses the uterus through the abdominal wall. This intervention should always be practiced with slowness and gentleness. It lasts some minutes, quarter of an hour, sometimes half an hour or more. The accoucheur should not forget that he is

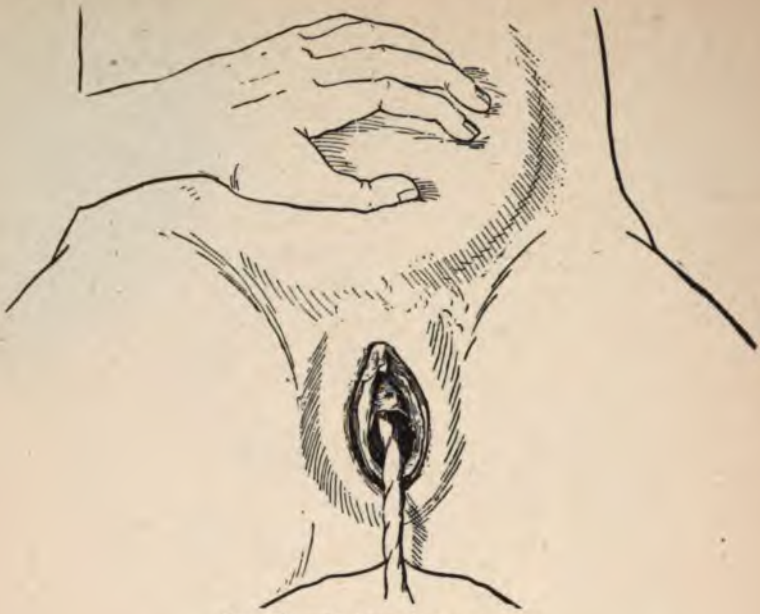


FIG. 287.—Delivery by expression.

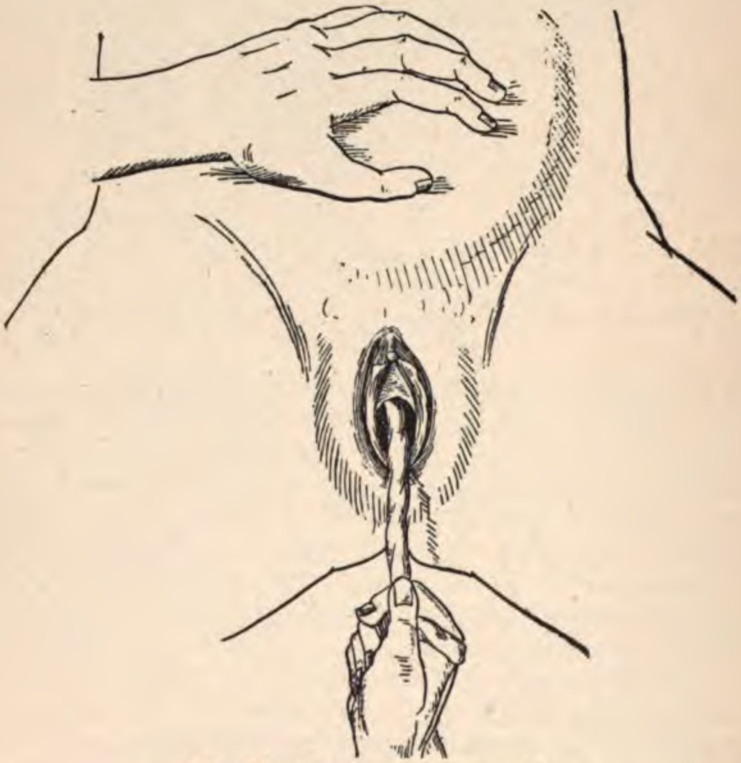


FIG. 288.—Delivery by mixed method.

only to second uterine action. During the third stage the uterine expression is continued, but moderated, less in the aim of aiding the delivery than in that of preventing inertia and hæmorrhage. With the other hand the placenta is drawn on by the aid of the cord. When the placenta makes its exit it is left to lie in the bed or in a receptacle placed at the vulva to receive it. One hand is still retained on the abdomen while the other draws the membranes progressively outward. The exit of the membranes should be particularly slow, for the least impatience at this moment is sufficient to cause their rupture and to favor retention.

After delivery it is well to leave the hand on the fundus of the uterus for a quarter of an hour, making slight friction from time to time, in the aim of watching retraction and of preventing inertia.

CHAPTER XIV.

POST-PARTUM.

The uterus is evacuated, the post-partum commences, it will be continued or not by lactation. The characteristic fact of the period is the genital wound, a multiple wound which commences at the raw surface left by the placenta and is continued by erosions of the cervix, of the vagina and of the vulva. All these ways are open for the penetration of microbes. Thus the dominant feature of this period is the menace of puerperal septicæmia.

To study the details of the consequences of labor it is necessary to successively consider:

I. The mother.
II. The child.
III. Lactation.

I. The mother.

A. *Modifications of the organism.*—The maternal organism modified by pregnancy, modified also by the accouchement, undergoes during the post-partum new changes destined to restore it progressively to the normal state. We shall study these phenomena in their relation to each system.

1. *Genital system.*—The vulva repairs its ruptures by first or second intention. The vagina becomes shortened and narrowed. The uterus undergoes, in its return to normal state, important

macroscopic and microscopic changes in the body and the cervix. The diminution of the volume of the body of the uterus is appreciated in practice by the height of the fundus of the organ.

This exploration should always be made after previous evacuation of the rectum and of the bladder, for the repletion of these reservoirs may give to the uterus an elevation of some centimetres, complicated by an inclination, more often to the right by the fulness of the bladder, and to the left by rectal impaction; when, on the contrary, the uterus rests freely in the median line, and the depth of the uterus is increased, it is fair to presume that it is due to a pathological condition of that organ.

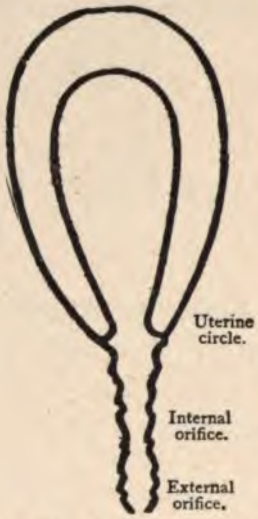


FIG. 289.—Uterus Post-partum.

This is the way in which the descent of the uterus is approximately made:

First week. The uterus which, after deliverance, was a little above the umbilicus, descends about a centimetre a day.

Second week. The descent is slower, and is with difficulty appreciable; at the end of the second week, fifteen days, in consequence, the fundus of the uterus is from seven to eight centimetres above the pubic symphysis. From this time, and still more during the month, until the return to menstruation, when the child is not nursed, that is to say, a month and a half after accouchment, it diminishes in volume, almost insensibly from day to day.

From the end of a month and a half to the end of the third month the uterus continues to diminish, but within limits too small to be appreciated by manual examination (touch combined with palpation). At this second period of the post-partum there are particularly the histological modifications (atrophy and fatty degeneration of the muscular fibres, reconstruction of the uterine mucous membrane), which continues until the uterus is restored to its normal condition.

The different modifications which affect the uterus in its return to the normal state are included in the term involution or uterine regression.

The cervix also undergoes important modifications to regain its normal state. The uterus, after delivery and at the beginning of post-partum, is composed of three parts (Fig. 289); a thick superior portion, the body of the uterus, a thin inferior portion consisting of two parts, the cervix and an intermediate portion which diminishes progressively to form the isthmus. The uterus during post-partum is the source of two phenomena of practical interest, the after-pains and the lochia.

After-pains.—These are only uterine colics analogous to those produced during labor, sometimes during pregnancy, and in some women during menstruation. Their characteristic symptom is the pain, and the woman compares them to those of accouchement, but of less intensity; their description is analogous, the irradiations into the hips and thighs are frequent, and sometimes the abdominal pain being felt but lightly, the patient complains only of cramps in the limbs. This should be remembered by the physician, as he is otherwise liable to be deceived regarding the condition. During the pain the uterus hardens, and at the end of each contraction a small quantity of blood or lochial fluid flows from the vulva. The pains, which come on shortly after deliverance, may last three, four, or five days, rarely more, and should not be confounded with nephritic, hepatic, or intestinal colic, which are of a different character. They differ from metritis and peritonitis by the absence of fever, an essential and most important characteristic, and by the intermittent pains accompanied by contraction of the uterus, which is the cause.

From an ætiological point of view after-pains are divided into two classes. One, symptomatic, caused by the presence in the uterus of a clot, a fragment of membrane or of placenta, or of some uterine debris; the uterus contracts painfully to expel the foreign body; the other, idiopathic, where the uterine cavity is empty or contains only the mucosities proper to this stage of the puerperium, and which is of a nervous character.

Primiparæ are rarely subject to after-pains; multiparæ suffer almost exclusively, a fact which no one appears able to explain. Compression exerted by the bladder and the rectum accentuate these pains, which is a therapeutic indication to evacuate these reservoirs.

Suction upon the nipple, in some cases, arouses these pains and makes them so severe that some mothers, desiring to nurse their children, cannot do so on account of the pain produced.

After-pains coming very frequently and severe should arouse suspicion of commencing septicæmia. These after-pains have no other inconvenience than that of being painful, but this may become so marked as to require active treatment: Tincture of digitalis, ten to twenty drops; tincture of viburnum prunifolium, ten to one hundred in twenty-four hours, about ten drops every two hours. Uterine massage. Hot cataplasms. Antipyrine, one to two grammes; hydrate of chloral, same dose. Sometimes a hot vaginal injection or an intra-uterine injection gives notable relief. But the most certain treatment consists in the administration of opiates.

1. *Lochia.* — The lochia is constituted by a genital flow of post-partum occurrence. The principal source is the internal surface of the uterus, and the accessory that of the cervix, vagina and vulva.

The lochia is:

From the first to the third day, sanguineous.
From the third to the sixth day, muco-pus tinged with blood.
From the sixth to the ninth day, muco-purulent.
After the ninth day the flow is normally very slight.

A chestnut juice, brick-dust red or deep coffee color, of the lochia, indicates a pathological condition which demands therapeutic attention. It is the same with purulent lochia, which, even without fever, indicates the presence of pathogenetic microbes in the interior of the genital organs and reveals a septicæmic process of variable intensity. The lochia have a special odor, *sui generis*, barely definable—an unpleasant, offensive odor, which it is necessary to clearly distinguish from the cadaverous odor which it takes in a pathological state, and which is one of the best indications of the onset of septicæmia. Familiarity with the odor, better than all description, will distinguish these important differences. The color and odor of the lochia are therefore valuable diagnostic signs of septicæmia.

The lochia, at the beginning, are composed of blood, leucocytes, epithelial cells from different parts of the genital tract, of mucus, sometimes of placental debris, and finally, even in a normal condition, outside of all complications, of various microbes, analogous in form to those of puerperal septicæmia, but of different nature perhaps. Exceptionally the lochia are quite scanty, and may seem absent; in other cases, on the contrary, they are copious, particularly in their sanguine period. The quantity, which is measured by the number of napkins soiled, is difficult to appreciate and define.

Sometimes, without appreciable cause, the sanguine discharge continues beyond the usual time, or after having stopped, reappears again and lasts for some days, retarding the re-establishment of the health and strength of the patient. The prolonged sanguineous lochia, which are probably due to a delay in the cicatrization of the uterine surface, sometimes provoked by unavowed coitus, may be happily modified and arrested by warm vaginal injections, the employment of ergotine or of ergot (which should not be given to nursing women, for this medicine has an evil effect upon the lacteal secretion), by digitalis, uterine massage, warm cataplasms, and sometimes by the employment of hot baths. In all cases the woman should retain the recumbent position until the discharge of blood has ceased. In rebellious cases an intra-uterine injection and curettage, followed by cauterization, may render signal service.

2. *Mammæ.*—The modifications of the breasts will be studied with lactation.

3. *Urinary system.*—The urinary secretion is active during the post-partum, especially the first few days. The elimination of the solid element of the urine is also augmented. We note in the urine the frequent presence of glycose. A frequent accident is the retention of urine. The bladder, compressed during accouchement, is in a state of paralysis, or paresis, during the first days of post-partum. To avoid accidents palpation of the abdomen should be practiced at each visit during the first few days. Treatment.—Hot cataplasms sometimes favor the emission of urine. Allow the patient to sit up to accomplish micturition. As a last resource, catheterism should be performed, with vigorous antiseptic precautions.

4. *Respiratory and circulatory systems.*—The modifications of the respiratory system are not yet well known. Those of the circulatory system are better understood. The principal phenomena is a notable diminution in the number of cardiac pulsations. They may fall to thirty-five a minute. This retardation of rapidity is pro-

duced a little after accouchement and lasts from eight to twelve days with a momentary interruption at the third day caused by lactation (Fig. 290). The blood undergoes a relative increase of the quantity of the fibrin and of the white corpusles.

5. *Nervous system.*—After the accouchement the woman is fatigued in general, but the excitement of labor and the joys of maternity most often prevent immediate repose, and this seldom follows before the end of two or three hours. Even then it is often interrupted by after-pains. Very often after delivery, or a little before, the patient has a slight chill without elevation of temperature or acceleration of the pulse. This is a physiological phenomenon and without importance.

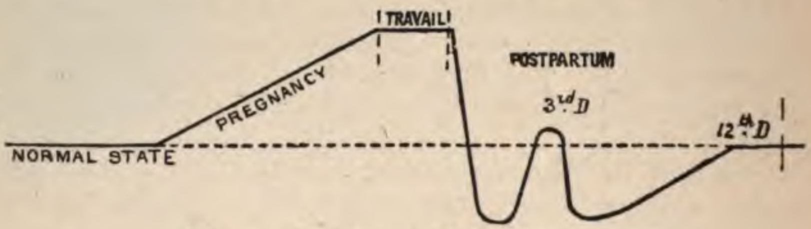


FIG. 290.—Modifications of the puerperal pulse.

6. *The Digestive system.*—The appetite quickly returns. Light nourishment should be given. Constipation is the rule and must be combatted by appropriate measures.

7. *General state* (*temperature, nutrition*).—The temperature in a normal state should never attain 38° C. during post-partum. When this degree is attained, there exists some complication. During simple regression, without lactation, nutrition seems active in all its processes. Lactation modifies these conditions. Under its influence absorption and elimination appear active, and, on the contrary, assimilation and disassimilation are retarded.

B. *Hygiene of post-partum.*—Two points remain for discussion: Genital antisepsis, and the gradual resumption of the usual mode of life.

Genital antisepsis.—*The vulvar toilet* should be made with a solution of carbolic acid, 1–50, or bichloride of mercury, 1–4000, using old linen rags or absorbent cotton (sponges proscribed because of their doubtful asepsis). In the interval of the toilets an antiseptic tampon of dry cotton should be applied to the vulva, simply held in place by apposition of the thighs.

Vaginal injections.—Vaginal injections are used to-day by the majority of obstetricians, one to three times a day, with a solution of carbolic acid or bichloride of mercury. If antiseptic precautions have been taken during accouchement and also during the latter part of pregnancy, injections during post-partum are useless and they are not without inconvenience, for they expose to the penetration of air into the genital organs, a favorable condition for the development of septicæmia. In a general way they should be reserved for cases where antisepsis has been incomplete during pregnancy or labor, for those where a grave intervention during accouchement has exposed to the penetration of septic agents, and finally, for those where some symptom indicates the presence of pathogenetic microbes in the interior of the genital organs.

Intra-uterine injections.—These injections are only employed in special conditions, to remedy a beginning septicæmia.

Gradual resumption of the usual mode of life.—After accouchement, in the absence of any complication, the patient should conform to the following precept:

First fortnight.—Bed.
  First week:
    First half—dorsal decubitus.
    Second half—lateral or dorsal decubitus at will.
  Second week:
    First half—the head may be raised by two to four pillows.
    Second half—the puerpera may sit up in bed, to eat, nurse, etc. At the end of the second week she may get up.

Second fortnight.—House.
  Third week:
    Lounge and reclining chair. Duration of remaining out of bed, an hour more each day:
      First day, one hour.
      Second day, two hours.
      Third day, three hours, etc.
  Fourth week:
    Arm chair; rocking chair, in case of fatigue. At the end of fourth week patient may go out.

II. Child.

A. *Physiological phenomena.*

1. *Weight.*—The average weight of the new-born is about three thousand grammes at the moment of birth. This diminishes one hundred grammes during the first two days and is regained in five days more, so that at the end of the first week the weight is identical with that at birth. The daily augmentation of the child's weight,

outside of these first seven days, is variable, but may be fixed at a daily average, as represented in Fig. 291.

2. *Temperature, circulation, respiration.*—The temperature is subject to an initial depression and then attains its maximum the day after birth, then it oscillates between 36° and 37° C. The initial depression is greater in proportion as the birth is farther from normal term. The number of pulsations oscillate around one hundred and twenty per minute. The respiration gives variable results.

3. *Cord.*—The cord, during the days consecutive to birth, desiccates. A groove filled with a purulent serum appears around its umbilical insertion. The cord falls off spontaneously between the third and sixth day. Sometimes there persists a small ulceration at the umbilicus that requires dressing.

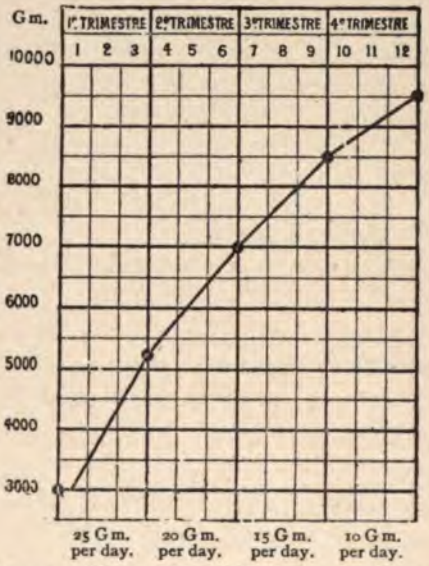


FIG. 291.—Weight of the child during the first year.

4.—*Dentition.*—*Milk teeth* (twenty).—The milk teeth appear in the following order:

Median incisors, four toward the sixth month.
Lateral incisors, four toward the ninth month.
First molars, four toward the twelfth month.
Canine, four toward the fifteenth month.
Second molars, four toward the eighteenth month.

All the lower teeth appear before the corresponding upper teeth, except in the case of the lateral incisors where this order is inverted (Fig. 293). The preceding dates are only approximate. The first teeth often appear later than the sixth month and they are exceptionally seen at birth.

The permanent teeth successively replace the milk teeth which fall before their appearance.

Successive order:

First molars, seventh year.
Central incisors, eighth year.
Lateral incisors, ninth year.
First bicuspids, tenth year.
Second bicuspids, eleventh year.
Canine, twelfth year.
Second molars, thirteenth year.
Wisdom teeth, twentieth year (eighteenth to twenty-fifth year).

Every year

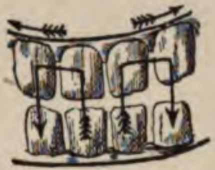


FIG. 293.—Order of eruption of the eight incisors (milk teeth).

Influence of dentition upon the health of the infant. The greater part of the ailments of the first year of life have been attributed to dentition, but the truth of this has not been demonstrated. Diarrhœa and a high fever which may cause cephalic congestion appear to be the only diseases which are clearly dependent upon dentition. In case of difficult dentition the local application of a weak solution of cocaine or a crucial incision of the gum over the tooth are the only means of producing any amelioration. Dentition being a cause of digestive derangement it is best not to wean the child during the successive periods of the eruption of the teeth. The best time for weaning is after the first molars or the canine teeth have appeared.

5. *Digestion.*—The milk undergoes digestion in the stomach and intestine, and is absorbed from the latter. The stools of the new-born child pass through three successive periods:

Meconial period (*three days*).—The child evacuates the meconium accumulated in the intestine during pregnancy. This stool is greenish and syrupy.

Transitional period (*one day*).—The meconium is mixed with digested milk.

Lactational period.—The residue of the digested milk gives an aspect resembling that of scrambled eggs. The stools number, at first, from two to four a day, later, toward the second month, from one to three.

6. *Cutaneous phenomena.*—The child passes through three successive phases, which last about three days each: 1. There is an acute cutaneous congestion, caused by contact with the air. 2. There is a variety of icterus caused by the transformation of the pigment deposited by the blood by the congestive phase. 3. The child becomes pale and gradually takes its normal rose color.

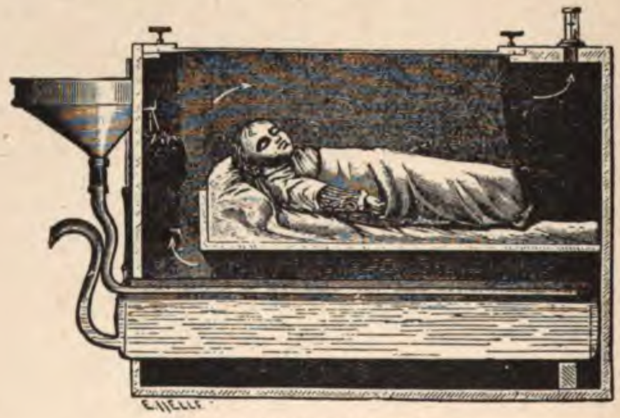


FIG. 295.—Section of the couveuse.

B. *Hygiene.*—1. *Vision.*—The eyes should be attentively watched and carefully inspected at each visit. This precaution is necessary on account of the dangers of purulent ophthalmia.

2. *Cries, Sleep.*—The cries are normal when they are of slight intensity and duration. When they become intense and prolonged they indicate suffering, the cause of which should be sought most often in hunger, thirst, or obstruction by the clothing. Sleep generally follows after nursing. It should take place in the cradle and not in the arms of the nurse. The child should be laid on its side in the cradle to avoid obstruction of the respiratory passages if vomiting ensues.

3. *Toilet.*—It will be well to give the child a hot bath of some minutes every morning, or to follow the English system of cold or

tepid baths, commencing during the hot season. During the course of twenty-four hours the ano-genital region should receive two to four cleansings, followed by powdering with starch, lycopodium or talcum.

4. *Temperature.*—The new-born child is very sensitive to the thermic variations met in its new life. To avoid these changes the temperature should be kept as nearly as possible between 85°–95° F. For children born before term the *convenses* introduced by Tarnier can be used with advantage (Figs. 295 and 296).

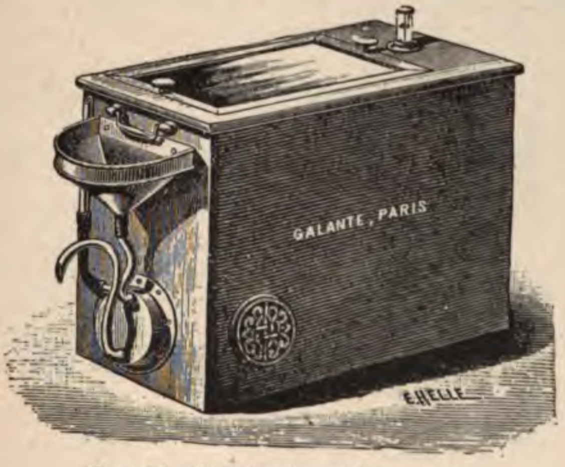


FIG. 296.—Exterior view of the couveuse.

III. Lactation.—*Maternal lactation.*—After conception and during pregnancy, the glandular lobes of the breasts, besides congestion, assume a notable development by proliferation of their elements. If at this time an antero-posterior section is made (Fig. 297) we note the following details: Beginning at the nipple we find, in following a galactophore, that it presents a fusiform dilatation and then resumes its former dimensions to finally ramify in the lobe to which it belongs. The canals and glands are formed by two layers, the eccentric of connective tissue, the concentric of epithelium. The epithelium is cylindrical in the galactophore, flattened and less rounded in the glandular culs-de-sac. This glandular epithelium plays the essential role in the secretion of the milk and of the colostrum. The globules of the milk are formed at the expense of the epithelium (Fig. 298) and the other elements are secreted by the glandular wall. The colostrum is constituted by the same elements as the milk, but differs by being more aqueous and by having the globules still contained in the muriform body.

The establishment of the flow of milk is characterized, during the first twelve hours, by an intense congestion of the breasts which become painful and tender, then the lacteal secretion is established, the tension diminishes and if the woman nurses the secretion continues. The establishment of the flow of milk is accompanied by *malaise*, often by cephalalgia and acceleration of the pulse. But the fever that before antisepsis was often observed at this moment was only a slight septicæmic manifestation. Milk fever does not exist. In the *normal state* the sequelæ of the post-partum are afebrile; the thermometer should not attain 38° C.

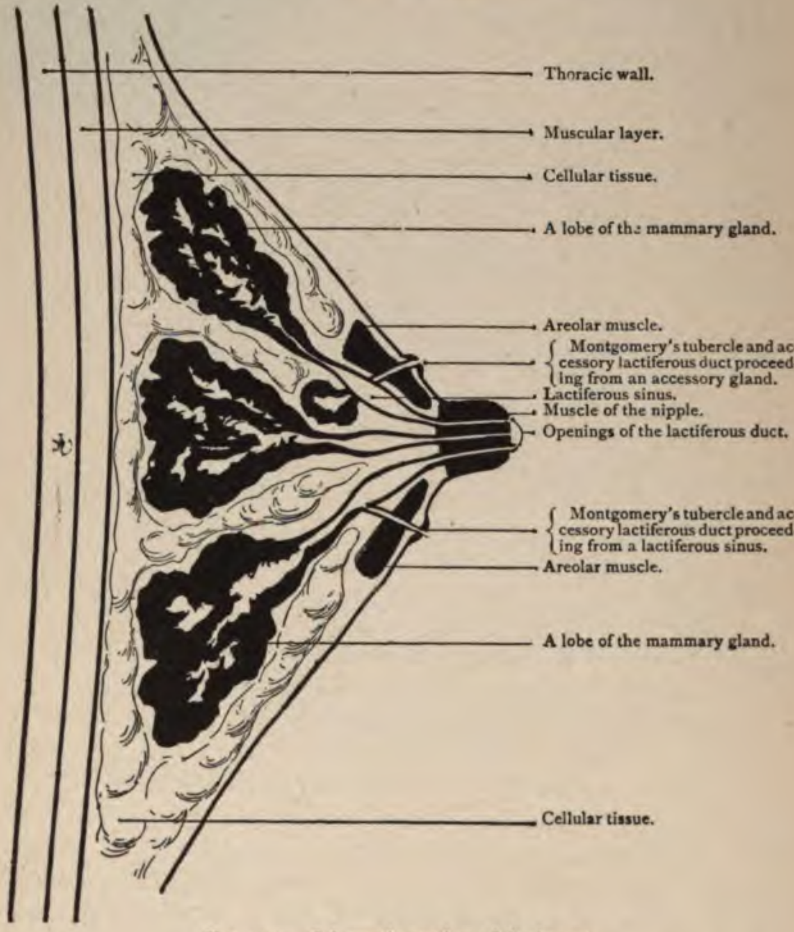

Thoracic wall.
Muscular layer.
Cellular tissue.
A lobe of the mammary gland.
Areolar muscle.
Montgomery's tubercle and accessory lactiferous duct proceeding from an accessory gland.
Lactiferous sinus.
Muscle of the nipple.
Openings of the lactiferous duct.
Montgomery's tubercle and accessory lactiferous duct proceeding from a lactiferous sinus.
Areolar muscle.
A lobe of the mammary gland.
Cellular tissue.

FIG. 297.—Schematic section of the breast.

With regard to allowing the woman to nurse the child, this depends upon the general and the local state. The majority of chronic diseases are not a contraindication for lactation, among them tuberculosis merits special mention. Every woman subject to tuberculosis, or even predisposed to this disease, should renounce lactation. Hysteria and pronounced anæmia are also contraindications.

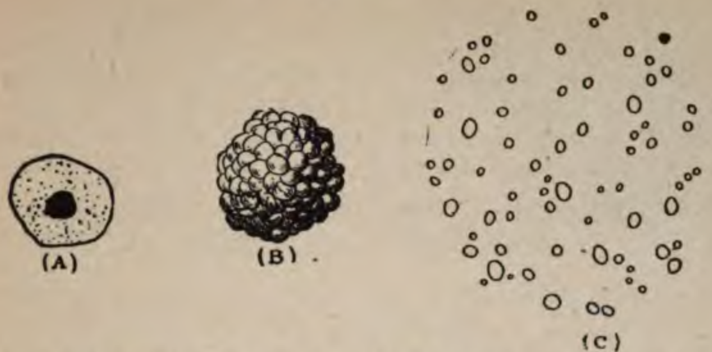


FIG. 298.—Formation of milk globules. (A), epithelial cell; (B), distention of the cell by fatty granules; (C), rupture of the cell, freeing the milk globule.

A flat or umbilicated nipple renders lactation difficult, sometimes impossible, but often this can be remedied, as will be seen later. The development of the gland and the abundance of colostrum should be taken into serious consideration. However, so far as local examination is concerned, great reserve is necessary, for often the physician is wrong in his prognosis.

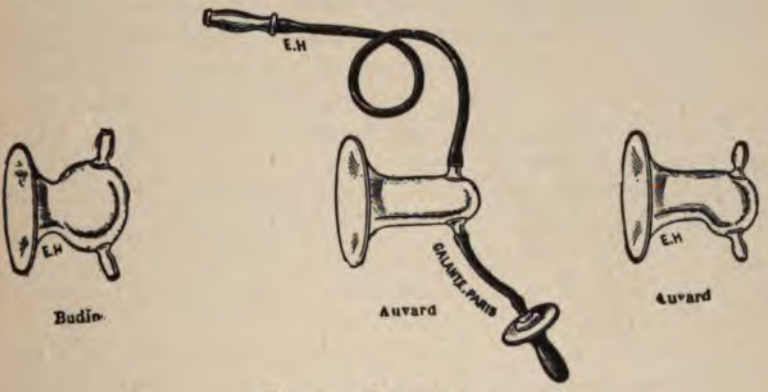


FIG. 299.—Breast pumps.

If the nipple be flattened the child's lips are unable to suck. Even when it is normal, the manipulations of the child may produce fissure that becomes very painful. To obviate the difficulties in such cases the breast-pump will be useful (Fig. 299).

CHAPTER XV.

PUERPERAL PATHOLOGY.—GENERAL DISEASES.—ECLAMPSIA.

An intense influenza may exceptionally cause abortion or premature delivery. Typhoid fever causes premature expulsion in a good half of cases. The same is true with regard to cholera. Pregnancy confers a relative immunity against malaria.* In cases of intermittent fever during pregnancy, quinine seems to concentrate its influence against the malarial condition and, far from being abortive, prevents premature expulsion. The exanthemata occurring during pregnancy cause abortion as follows: Measles in one-half of the cases; scarlatina in a proportion difficult to establish; with the confluent form of small-pox abortion is the rule; vaccination of the pregnant woman does not interrupt the progress of pregnancy. Erysipelas during pregnancy often causes premature expulsion and its prognosis during the post-partum is always serious. Rheumatism occurring during the puerperal state may show itself in three forms—a more or less generalized articular rheumatism, a mono-articular rheumatism, and finally, a uterine variety, simply characterized by uterine pains.

Pregnancy by aggravating scrofulosis predisposes to the development of tuberculosis. The majority of phthisical patients are badly influenced by the puerperal state. Beside tuberculosis interferes with the development of the fetus. This disease is transmitted through the placenta.

Pregnancy occurring during the evolution of syphilitic manifestations aggravates their character and prolongs their duration.

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* Instead of the happy influence exerted by pregnancy, accouchement, the same as all traumatism, often awakens the latent action of malarial poison; whenever a woman previously attacked with malaria experiences a chill followed by fever, it is necessary to remember, if the characteristic signs of puerperal septicæmia are not present, the possibility of an intermittent fever. This diagnosis is very important, for in this case the sulphate of quinine assures the cure. It should not be forgotten that with women who are nursing the sulphate of quinine passing in the milk may produce grave, sometimes fatal, accidents in the nursing. It is necessary in these serious cases to discontinue nursing, the more because the cessation of nursing has a favorable influence upon the course of the disease; in benign cases the discontinuance is only momentary; the infant may be suckled three hours after the administration of the quinine, having previously acted upon the kidneys with a diuretic to promote the elimination of the quinine.

If the onset of syphilis dates back several years, its influence on pregnancy will probably be nul and the child unaffected. If syphilis is transmitted to the woman at the moment of conception, the child will almost surely be syphilitic. When syphilis is transmitted to the woman after conception, during pregnancy, the contamination of the child is to be feared in proportion as the beginning of the disease approach the date of conception, and less to be dreaded as it is near term.

Eclampsia.—Eclampsia is a disease characterized by a series of convulsive attacks analogous to those of epilepsy, occurring at a variable period of the puerperal state, most often near accouchement.

Symptomatology.—Prodromata, though often wanting, are more frequent in eclampsia of pregnancy than in that of labor, and in eclampsia of labor than in that of post-partum. They consist of cephalalgia, especially frontal, with weakening of the memory and intellectual apathy, bilious or alimentary vomiting, insomnia, *malaise*, vertigo, and sometimes prolonged lumbago.

But the three principal prodromata, which constitute a sort of premonitory tripod, are:

The disturbances of vision (visual fatigue, cloudiness, hemiopia, diplopia, complete blindness).

The epigastric pain (result of the dyspnœa).

The dyspnœa (result of the insufficiency in the functions of the lungs).

Sometimes these prodromata follow several days or weeks before the first attack, again, they may only precede it by a few seconds.

Albuminuria can also be considered as one of the most important of the prodromata of eclampsia, but it is convenient to separate it from the preceding symptoms, which are subjective, as it can only be found by the use of objective researches.

Lead poisoning very frequently causes the death of the fœtus during pregnancy, and also that of the child after birth, on account of its lack of development. The influence of the husband is analogous to that of the mother, though less marked. Poisoning by tobacco occurs by the penetration of nicotine into the amniotic liquid during pregnancy and into the milk after accouchement. The influence of this poisoning on the production of abortion although probable is, however, disputed.

Under the term progressive pernicious anæmia, Gusserow has described a disease of pregnancy characterized by the progressive diminution of the red globules, terminating in anæmia and in death. This disease is probably only an exaggeration of the anæmia common to pregnancy.

Attack.—The attack of eclampsia is subdivided into four periods, invasion, tonic spasm, clonic spasm and coma, followed by an interval of calm.

1. *Invasion (duration half a minute).*—The face is the part first attacked. The forehead wrinkles and becomes smooth; the eyelids lower and raise; the ocular globe turns in various directions until the pupil is carried upward; the pupil is dilated and insensible to light; the wings of the nose are pinched and depressed; the mouth twitches and is soon drawn to one side, most often to the left; the head undergoes occillations drawing it to the right or left and soon fixing it definitely to the left.

2. *Tonic spasms (duration one minute).*—After these facial movements, a second period follows characterized by generalized tonic convulsions. The features become immobile; the head is drawn backward; the thorax is fixed; respiration suspended; the arms are against the body, the forearms in pronation, the fingers closed and around the thumb; the abdominal wall is tense; the lower limbs stiffened. Often the body describes an arc of a circle with its two extremities, the head and feet, supported by the bed. The respiration being suspended, the circulation is interrupted so that a general cyanosis quickly follows.

3. *Clonic spasms (duration two to three minutes).*—The clonic convulsions invade the whole body, from the head, where they commence, to the feet. The face is agitated by movements analogous to those of the onset, but more violent and more prolonged. The tongue projects between the teeth and is often bitten. After the face, all the head, then the thorax, the upper limbs, the abdomen and, finally, the lower limbs become involved in convulsive movements. This general convulsion soon gives way to coma.

4. *Coma (duration quite variable, from some instants to several hours).*—After the period of agitation there follows a comatose sleep. Then the patient returns to her senses completely, or she remains in a state of somnolence, or finally, she does not recover from the comainto which she has been plunged by a last attack. Besides the symptoms already given, there is sometimes produced an involuntary evacuation of urine and feces, during or at the end of the clonic spasms.

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Interval between the attacks.—The duration of this interval is quite variable, sometines it is nul, two or several attacks succeeding each other without interruption, sometimes it amounts to several hours.

The temperature sometimes remains normal, or even descends below normal, most often it rises to 38–39° C. Its ascension is in proportion to the gravity of the case. The pulse follows the temperature.

Albuminuria usually exists for some time, occasionally it only appears during the attack, exceptionally it is completely wanting.

The œdema, the puffiness of the face, is accentuated under the influence of the attack, to such a point that the swelling of the face renders the person unrecognizable.

Duration.—Sometimes the eclampsia is confined to a single attack and only lasts a short period. Usually there are from five to twenty attacks. But their number may be much more considerable, as Crettet cites a case having one hundred and sixty.

Terminations.—Cure occurs by a simple cessation of the attacks and of coma. It may be complete, or incomplete leaving behind it disturbances of memory and of vision, an habitual stupor and slowness of action, a persistent anæmia and even mania. Death is produced by the progress of the poisoning of eclampsia, exceptionally during the attack by asphyxia and syncope, by a complication, pulmonary congestion and œdema, cerebral hæmorrhage and œdema, asphyxia resulting from a considerable swelling of the tongue, and by independent complications, such as puerperal septicæmia or grave genital hæmorrhages.

Pathological anatomy.—Varied lesions are found but none of them are constant.

Nervous system.—Serous infiltration, congestion, anæmia, hæmorrhages of the meninges.

Respiratory system.—Lungs, congestion, apoplexy, œdema, emphysema. Pleural cavities, serous infiltration.

Circulatory system.—Heart, puerperal modifications.

Urinary system.—Frequent but not constant alteration of the kidneys, presenting a simple hyperæmia, or the lesions of a recent or an old nephritis.

Digestive system and appendages.—In the digestive system, only the state of the liver is of importance. This organ may be the seat of an advanced fatty degeneration, multiple hæmorrhages, lesions of diffused parenchymatous hepatitis.

Genital system.—State of the organs in relation with the period of the puerperal state in which death takes place.

Pathogeny.—I present in resume in the following table a view, as a whole, of the different theories, comprising therein the theory of general arrest of organic elimination with which I will close.

Pathogenetic theories of eclampsia.

A. *Eclampsia—neurosis.*

1. Mauriceau.
2. Cohen: neurosis, having its point of departure in the uterine reflex.

B. *Eclampsia—modification of the nervous centers.*
  1. Mauriceau: congestion or anæmia.
  2. Marshall de Calvi: cerebral œdema.
  3. Traube: anæmia followed by œdema.

C. *Eclampsia—alterations of the blood.*
  1. Renal theory, 1818. Blackall and Wells (Cotugno).
    Uræmia—Wilson
    Amnionæmia—} Frerichs: formation in the blood.
    Treitz: formation in the intestines.
    Creatinæmia—Schottin.
    Urochronæmia—Thudichum.
    Oxalæmia—B. Jones.
    Potassiæmia—Despine.
    Urinæmia—Peter.
  2. Theory of general elimination, 1818. Riviere and Anvare.

Neurotic eclampsia is not accepted at present, nor is the influence exercised by the modifications of the nervous centers.

The renal theory contains a large portion of the truth. However, it is not completely satisfactory for the following reasons:

1. Apyrexia is the rule in urinæmia and, on the contrary, fever in eclampsia.

2. The urinary secretion is sometimes, although exceptionally, normal in eclampsia (eclampsia without albuminuria).

3. Sometimes eclampsia presents a great analogy with grave icterus (diffuse parenchymatous hepatitis), the origin of which cannot be related to urinæmia.

These objections disappear if, in place of localizing in the kidney, the functional disturbance which causes eclampsia, is extended to all the eliminating organs. So far as these different organs are concerned we have:

Kidneys.—Urinæmia; albuminuria; anuria.
Liver.—Hepatæmia;* icterus; acholia.
Intestine.—Intestinæmia; constipation.
Lungs.—Pneumænia; dyspnœa.
Skin.—cutæmia; cutaneous dryness.

Among the different symptoms, indicating the functional disturbance of the eliminating organs, the cutaneous dryness and the constipation (which is actually an intestinal dryness) are of small importance on account of their frequence and common occurrence. Dyspnœa is a marked premonitory symptom of eclampsia. Icterus hardly ever occurs except during eclampsia itself, but it is far from being rare, especially in serious cases. The acholia is only incomplete and difficult of appreciation. The anuria sometimes becomes complete during the attack, but as a premonitory symptom there is only observed a diminution of urine.—Albuminuria is the most important premonitory symptom.

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* *Hepatæmia* indicates the accumulation in the blood of all the elements produced by the default of the hepatic function (suppression of the uro-poietic, hæmato-poietic and biliary functions) or by a deviation of function (bile secreted and thrown into the blood). For the intestine I also say ***intestinæmia***, and not ***stercoræmia***, for stercoræmia indicates the presence in the blood of material contained with the feces, while here there is more a suppression of those that furnish the intestinal secretion. Likewise ***pneumæmia***, and not ***asphyxia***, for asphyxia is the simple deprivation of oxygen, while I note especially the absence of the elimination of the toxic alkaloid. Finally, for the skin, we have cutæmia and not sudoræmia.

Ætiology.—Parity: proportion, four primiparæ to one multipara. Twin pregnancy and, in general, any exaggerated distention of the uterus predisposes to eclampsia. Any difficult accouchement may become a cause of this disease. Heredity seems to play some part in the production of eclampsia. Compression of the ureters or of the urethra (retention of urine) by the gravid uterus may become a cause, by interrupting the function of the kidney. Blot has demonstrated that eclampsia is most frequent among epileptics. The contagion of eclampsia itself cannot be admitted, but a disease of the eliminating organs (infectious nephritis, infectious pneumonia) may, by contagion, indirectly cause an evolution of puerperal convulsions.

Frequency.—Albuminuria exists in about one-tenth of pregnent women, and eclampsia in one thirty-fifth of the albumiuurias of pregnancy, giving a proportion of eclampsia of one three-hundred-and-fiftiehs of pregnant women.

Prognosis.—About one-quarter of the cases of eclampsia die, and two-thirds of the children succumb.

Treatment.—The therapeutic means that are employed against eclampsia are very numerous. They can be grouped as follows:

1. Skin
   - Revulsives.
   - Diaphoretics.
   - Baths.
2. Digestive system
   - Purgatives.
   - Emetics.
3. Urinary system
   - Diuretics.
   - Milk.
4. Respiratory system—Oxygen.
5. Circulatory system
   - Compression of the carotids.
   - Venesection.
6. Nervous system
   - Sedatives.
   - Anæsthetics.
7. Genital system
   - Premature rupture (artificial) of the membranes.
   - Induced accouchement.
   - Active accouchement.
   - Forced accouchement.
   - Cæsarian operation post-mortem.
8. Various medications.
9. Minor attentions.

I shall enter into the details of these various means and the results they have afforded. I shall only indicate the use of the best and the most efficacious among them for:

A. Preventive treatment.
B. Curative treatment.
C. Consecutive treatment.

A. *Preventive treatment.*—The necessity for watching for the appearance of albumen in the urine of the pregnant women is well understood. The preventive treatment par excellence consists in the milk diet, continued as long as there is albumen in the urine. Induced accouchement will be reserved for quite exceptional cases. In grave, menacing cases, where plethora is clearly present, it becomes necessary not to hesitate in making a venesection of three hundred to five hundred grammes.

B. *Curative treatment.*—Among the minor attentions, a handkerchief should be placed between the teeth to prevent biting the tongue. Œdema of the lower limbs, and particularly of the vulva, is sometimes so considerable as to interfere with parturition. A prolonged compression in certain cases, in other cases puncture made with an aseptic instrument, will be the best treatment. In cases of exceptionally grave eclampsia the suspension of respiration for some time may be the cause of death. It will be well then to attempt artificial respiration.

With regard to curative treatment proper, the means to be employed can be grouped in six divisions; three of capital importance, a major therapeutic tripod, and three of secondary importance, a minor therapeutic tripod. The major tripod consists of anæsthesia, of venesection and of uterine evacuation.

In a general way, we may say that anæsthesia should be applied in every attack of eclampsia. It will be obtained by the use of chloral or chloroform. Chloral should be given in as high a dose as possible, 10, 14, 16 grammes in twenty-four hours, and as much as possible by enema. Chloroform will be administered to complete anæsthesia and in a sufficient dose to keep the patient in a state of calm.

Bleeding will be employed in plethora, when the convulsions are violent and when the coma is accompanied by symptoms of asphyxia. According to the case, there will be removed five hundred to one thousand grammes, exceptionally more.

With regard to emptying the uterus, we seek to obtain this as promptly as possible, but without having recourse to violent measures. If labor is not declared, spontaneous contractions will be awaited, except on special indications, when accouchement will be induced. If dilatation has commenced, forced accouchement will be avoided unless there is present a menacing danger to the mother, when it will be authorized. As soon as dilatation is complete the accouchement must be terminated by the forceps or by version and extraction. The delivery of the appendages will be equally active within the limits prescribed by prudence.

In our minor tripod are placed purgatives, diuretics and sudorifics. It is not necessary to discuss them as these remedies are common to general medicine.

C. *Consecutive treatment.*—The consecutive treatment may be summed up in a double indication, for one part, to remedy the different complications which succeed to eclampsia, for the other to prevent the return of the disease by removing the cause and adopting preventive therapeutic means.

CHAPTER XVI.

PUERPERAL SEPTICÆMIA.

It has been reserved for Pasteur to make known the microbic nature of the causal element of this disease. The microbes met in puerperal fever are of four varieties:

1. The bacilli in rod-like forms, cylindrical bacteria, the cause of rapid septicæmia.
2. The micrococci in chaplet-form, the source of an attenuated septicæmia.
3. The micrococci in double points (the diplococcus) the cause of suppuration.
4. The micrococci in isolate points, of a role not yet well established.

Though the respective part played by each of these varieties is still unsettled, their microbic influence, considered in a general way, is beyond contest, so that puerperal septicæmia is, without doubt, a microbic affection.

We have now to see how these microbes arrive in the feminine organism, that is, the ætiology of puerperal septicæmia. Let us compare the pregnant woman to a fortified and besieged city; a projectile produces a break in the ramparts, the same as accouchement a series of wounds at the genital surface of the woman. What results from this breach? If the enemy be distant the besieged will have time to repair the gaps before their arrival, the same as during post-partum, nature cicatrizes the genital wounds against all aggressions of the microbes. If, on the contrary, the enemy be near, they attempt to penetrate and a sharp struggle ensues. This struggle in the breach represents the inflammation of the genital wounds (localized septicæmia). If the organism is victorious, the microbes are repulsed, all is confined to the local septicæmia. But, on the contrary, if the assailants are successful the city is invaded, the combat becomes general. In the same way if the microbe penetrates into the economy its triumph causes the death of the woman; its defeat, cure.

To comprehend this struggle we have to examine:

1. The state of the besieged city (puerperal state).
2. The breech (genital wounds).
3. The enemy or the assailants (microbes).
4. The passages leading to the city and into its interior (mode of arrival and of penetration).

1. *Puerperal state.*—The modifications produced by puerperality, in particular in the composition of the blood, are seen to predispose to the invasion of the septicæmic microbe.

2. *The genital wound* is multiple and composed of the surface of the placental insertion, as well as the solutions of continuity existing in the cervix, the vagina, and the vulva. Any wound outside the genital sphere, notably those of the nipples, of the skin (excoriations of the buttocks, etc.), may lead to the same results. Sometimes the penetration occurs by the urinary passages (cystitis, infectious nephritis), notably in consequence of a septic catheterism. May the microbes also enter by a solution of continuity of the digestive and respiratory passage? This is possible but it has not been demonstrated.

3. The *microbes* have been previously described. Each sudden invasion that they make into the organism is marked by a chill.

4. *Mode of arrival and of penetration:*

a. Arrival at the organism.—In a certain number of cases, perhaps more frequently than has been supposed, the puerperal microbes are found during pregnancy in the vagina and cervical canal, simply waiting favorable conditions to multiple and penetrate into the maternal organism. This multiplication will be favored during pregnancy by any local suppuration (vaginitis), by the flow and the stagnation of blood (hæmorrhages), and after accouchement, by the putrefaction of debris retained in the uterus. Outside of these cases, the carrier of the microbes to the organism may be a liquid (non-sterilized injection), or a solid body (materials of dressing, injection canula, obstetrical instruments, finger of the attendant, etc.). May a gaseous body, the air for example, serves as a carrier for puerperal microbes? The generality of obstetricians admit that transmission by the air is impossible. It will be wise, however, to act as if contagion through the air were possible.

b. Penetration into the organism.—The microbes penetrate into the organism:

By way of the blood, veins: phlebitis, symptoms of rapid generalization.

By way of the lymphatic vessels: lymphangitis, phlegmon, adenitis, inflammation of the serous membranes (notably peritonitis). Symptoms of diffusion in general much slower, the glands often forming an impassible barrier, such are cases where the septicæmia especially evolves as a local affection with only slight general reaction.

In some cases of puerperal fever, it is impossible to detect any mode as contagion and septicæmia appears to be spontaneous. This is a false interpretation, the ways of contagion are multiple and sometimes difficult to recognize, and besides, contagion is possible by the intermediary of microbes remaining some time in the genital organs.

Pathological anatomy and symptomatology.—Puerperal septicæmia begins exceptionally during pregnancy or accouchement, but almost always from the second to the tenth day after delivery. It may assume quite varied clinical forms, making its description difficult. For clearness I shall adopt seven types, including the principal forms from which the secondary or mixed forms may be derived. I shall also speak of some special forms in terminating.

1. *Generalized form without lesions.*—*Acute non-suppurating septicæmia.*—After accouchement, intense chill the following day and the day after. Rapid ascension of temperature to 40° to 41° C. Great acceleration of the pulse, which soon becomes irregular, imperceptible. Intense and progressive dyspnœa. Face pale, livid, sometimes cynotic, tongue red and dry. Abdomen scarcely swollen. Vomiting sometimes marked, sometimes wanting. Black and extremely fetid diarrhœa. Urine scanty, very albuminous. *No trace of localization.* Acute terminal delirium, sometimes giving place to coma in the last moments. Death in thirty-six or forty-eight hours or in three days. The autopsy remains negative. Bacteriological examination of the blood alone demonstrates the presence of culpable microbes.

Sometimes in place of this early beginning and rapid march, fever appears, preceded by one or several chills, somewhat later taking a certain analogy with that of typhoid fever, with sometimes an ataxic predominence, sometimes an adynamic. The patient succumbs in some days in a coma which has succeeded to delirium, or with pulmonary complications.

2. *Generalized form with lesions.*—*Acute suppurative septicæmia.*—This form is characterized by the formation of multiple abscesses, probably of venous origin (infectious phlebitis), which may occupy any part of the organism. The general symptoms exist alone in the beginning, during a certain time, and are then followed by various abscesses. The appearance of the symptoms is later than in the acute non-suppurative form. The initial chill scarcely ever occurs before the fifth day and sometimes not before ten or fifteen days and even more. This chill is usually intense and prolonged. After this first chill, the state does not appear grave, except a fever which presents great variations. But a second and a third chill quickly follow, usually violent and without periodicity. The general state is aggravated, the skin is dry, the face pale, the appetite nul, the tongue red, the thirst excessive. Diarrhœa is abundant and fetid. The urine is scanty and almost always albuminous. The chills succeed in variable number. Their interval at the beginning

is marked by periods of complete apyrexia. But soon the fever becomes continuous, intense and contributes to the aggravation of the general state. Thus far the most attentive local examination reveals no localized lesion and, except a slight painfulness which sometimes exists about the broad ligaments, the manifestations of the disease reveal no distinct state in any organ.

But after a number of days, which most often vary from eight to fifteen after the first chill, follows a second period in which multiple abscesses are shown. The suppurations may occupy any part of the organism, I shall only mention their seats of predilection:

Genital organs.—Abscess of the broad ligament, the size of a pea to that of an apple and even more. Pus in the uterine sinus and in the tubes.

Nervous system. — Suppuration of the meninges. Suppurative phlebitis of the sinuses. Abscess in the cerebral or medullary parenchyma.

Respiratory system.—Purulent pleurisy. Infarctus and abscess of the lungs.

Circulatory system.—Suppurative pericarditis. Ulcerous endocarditis. Abscess of the cardiac wall. Small phlebitic or periphlebitic abscess at any point of the body. Infarctus and abscess of the spleen.

Digestive system.—Abscess of the dependent glands, notably the liver, of which infarctus (miliary abscesses or larger) are excessively frequent.

Urinary system.—Besides the vesical complications are frequently noted infarctus and multiple abscesses of the kidney, also a perinæal suppuration.

Regions. — Abscesses of the cellular tissue. Echars of the projecting regions (trochanter, sacrum). Articular abscess. Suppuration of the synovial tendons. Abscesses cf the periosteum and of the bone itself.

These various suppurations are manifested by their usual symptoms, hidden here in the importance of the general symptoms. Let us simply note icterus in the hepatic complications and the stethoscopic phenomena in the pulmonary complications.

Cured cases are the exception; death is the rule. It follows under the influence of the progressive poisoning of the organism, to which the functional disorders caused by the visceral suppurations are auxiliary.

3. *Peritonæal form—peritonitis.*—Puerperal peritonitis takes its origin in the genital organs. Sometimes it is consecutive to an inflammation first localized in the pelvic cavity; sometimes it is primary. This generalized peritonitis is one of the most frequent forms of puerperal septicæmia. It is usually announced by a violent pain and an intense chill. The pain arises in the uterus and soon

radiates to all the abdomen with progressive swelling. The patient lies on the back, immobile, so as not to increase her sufferings. The face shows the pain and takes that special expression met in peritonæal affections. The tongue is dry, the thirst acute, the hiccough almost continual, the vomiting incessant, first alimentary, then bilious. Diarrhœa is the rule and in contrast with the usual constipation of non-puerperal peritonitis.

Respiration becomes difficult, and the dyspnœa seems to increase in proportion to the distention of the abdomen. The fever is high, the pulse frequent, the lochia is little abundant and usually fetid. The lacteal secretion dries up, or, if not yet established, it is not produced at all.

Cure may take place, when the disease is vigorously combatted at the onset, then the symptoms progressively diminish. But the most usual termination is in death, which follows, either under the influence of the progressive asphyxia due to the poisoning of the whole organism and to the distention of the abdomen, or under the influence of the extension of the inflammation to the pleura and to the pericardium.

The lesions found in the autopsy are those of suppurative peritonitis.

4. *Periuterine form—pelvic peritonitis.—Phlegmon of the broad ligament.*—In proportion as we advance in this description, we see the septicæmia become more and more localized and its gravity decrease. In fact, the more septicæmia becomes localized, the better is its prognosis.

Chills followed by fever and pain are the symptoms which, here, as in peritonitis, open the scene, but their intensity is less than in this last disease.

The general symptoms are nearly the same in pelvic peritonitis and in phlegmon of the broad ligaments and may be resumed in a febrile state, more or less marked in relation with the gravity of the local conditions, but the progress of these affections is essentially different and requires separate description.

a. *Pelvic peritonitis* is manifested by a swelling at the posterior cul de sac of the vagina. There is constituted at this point a tumor which pushes the uterus forward and upward. If resolution occurs this tumor takes a harder consistency and becomes progressively smaller and more indurated. If suppuration takes place the tumor increases in volume and in place of induration fluctuation is found. This abscess, encysted by false membranes, may, exceptionally, be absorbed. More often it opens into the vagina or rectum, or into the peritonæum. Opening into the vagina or rectum, whether artificial or natural, lead to cure at the end of a variable time. The opening of the pus into the peritonæum causes a general peritonitis, which is fatal in a majority of cases.

b. Phlegmon of the broad ligaments.—This phlegmon is usually unilateral, and more often on the left than on the right. It forms a tumor analogous to that of pelvic peritonitis but occupies the lateral cul-de-sac, pushing the uterus toward the healthy side. Resolution may occur by induration and progressive diminution, or by suppuration. The abscess may be capable of opening into the rectum, vagina, peritonæum, or bladder. The suppuration may also open externally through the abdominal wall.

5. *Uterine form—metritis.*—Uterine septicæmia or septic metritis, begins by pain and elevation of temperature, but usually the initial chill is wanting. The pain is very acute and at first simulates that of peritonitis. But it is localized in the subumbilical region of the abdomen and it is only pressure on the uterus that aggravates it. This metritis may give rise to a contiguous inflammation, even to a generalized peritonitis, but usually, especially when properly treated, it terminates in resolution, or degenerates into a chronic parenchymatous metritis.

The general state is usually but slightly affected. The fever is moderate, the temperature, aside from complications, rarely passes 39° C. Cure is the rule.

6. *Vulvo-vaginal form—vulvo-vaginitis.*—After delivery, especially from the third to the fifth day, there is often found on the internal surface of the labia and on the terminal portion of the vagina grayish surfaces of gangrenous aspect, like exudates of diphtheritic appearance, to which has been given the name vulvar or vaginal eschars. These eschars are only the local manifestation of puerperal septicæmia.

In some cases they are not accompanied by any general reaction, and, under the influence of local care, the exudation disappears and cicatrization occurs without accident.

But in other cases they become the origin, exceptionally, of phlebitis, more often of a lymphangitis, which induces adenitis of the inguinal glands, causing, by propagation, phlegmon of the iliac fossa and even peritonitis. The septicæmia then becomes general and assumes an increasing gravity.

7. *Mammary form—mastitis.*—As at the vulva, septicæmia may remain absolutely local or extend to more or less distant parts. *Local* it is manifested in the form of fissures, generally situated at the base of the nipple. These fissures are deep and covered by a grayish coating. From the nipple the septicæmia may follow different ways to reach the gland-producing abscess of the breast, or it may reach the axillary region by the lymphatics, producing adenitis, and passing this point may cause general septicæmia, though the last is scarcely ever observed.

In the great majority of cases the mammary septicæmia is confined to the lesions of the nipple and of the mammæ, with a general reaction in relation with these local accidents.

8. *Special forms.—a. Cystitis and nephritis.*—This form of puerperal septicæmia is rare. During pregnancy or after delivery, in consequence of a septic catheterism, a cystitis is declared; the inflammation follows the ureter to the kidney, an infectious nephritis is the result, and is manifested by its usual symptoms. This nephritis may be the cause of puerperal convulsions.

b. Phlebitis of the lower limbs.—This phlebitis is generally known as phlegmasia alba dolens. It presents two forms, especially different in their initial period.

The first generally begins about the fifteenth day of post-partum, when, since accouchement, the apyrexia has been complete and the condition as satisfactory as possible. At this moment there occur a moderate fever and a pain in the iliac fossa or in the calf of the leg. Then the phlegmasia runs its course and lasts from one to three months.

The second succeeds to other septicæmic manifestations, fever and chills, onset of peritonitis, etc. The various symptoms appear three to six days after accouchement and at first no clear localization can be found, then, the phlebitis is declared and the septicæmia becomes localized in the veins of the lower limbs.

c. Paralyses.—Besides paralyses occurring during the puerperal state, under the influence of causes independent of that state, and not including pareses of the lower limbs, which result from compression during accouchement, there exist hemiplegias and paralyses still incompletely understood and which appear of septicæmic nature. Their prognosis is in general benign.

d. Puerperal eruptions.—Besides the eruptions independent of the puerperal state, there is sometimes seen after delivery erythematous plaques, the confluence of which recalls the aspect of the skin in scarlatina. This eruption seems to be a simple cutaneous manifestation of puerperal septicæmia.

Diagnosis.—There are two symptoms which the physician should carefully look for during the post-partum period, for they most often indicate imminent septicæmia, and permit of recourse to a preventive treatment, which may avoid its occurrence or diminish its gravity; these are a general malaise, of which a headache is the most clearly localized sensation, and fœtidness of the lochia. When fever appears, preceded or not by one or more chills, the diagnosis will vary according as the septicæmia is from the beginning localized or general.

a. Localized septicæmia. All peritonitis, pelvi-peritonitis, all inflammations of the large ligaments, all metritis, lymphangitis of vulvo-vaginal origin, or mastitis, should be regarded as manifestations of puerperal septicæmia. The exceptions to this rule are so rare that they may be practically ignored. Simple traumatism without absorption of the septic elements is incapable of producing these complications. It is sufficient to be convinced of this fact, to see the apyrexia, which is the rule after accouchement necessitating the most difficult intervention when asepsis has been vigorously observed. Each of these inflammations is, therefore, of microbian origin, and whenever the physician diagnoses their existence he will be assured of the presence of puerperal septicæmia.

b. General septicæmia. A fever more or less intense having declared itself during the first days of the post-partum period, an attentive examination not discovering any localization, it is important to know if this elevation of temperature is due to septicæmia or another affection.

Acute articular rheumatism possesses in common with septicæmia articular manifestations, but these manifestations are initial in rheumatism, late in septicæmia. Articular pain is the dominant symptom in rheumatism, but accessory only in septicæmia.

Typhoid fever will be more difficult to distinguish from septicæmia, which sometimes assumes a typhoid aspect. The onset of typhoid in general is without premonitory chill and is accompanied with epistaxis, in which respect it differs from septicæmia. The other symptoms do not present any characteristic difference, and it is only the appearance of the rose-colored spots which, in doubtful cases, indicates the presence of typhoid fever.

Diphtheria can be mistaken for septicæmia only when the disease is located on the vulva ; besides, this is a very rare localization of this disease. Diphtheria will be recognized by the whitish appearance of the false membrane, which is of a grayish color in septicæmia. The diagnostic error in this case is of minor importance only, as the treatment of the two diseases is almost the same.

Tuberculosis, whether it has existed for some time or appeared only during the puerperium, may, following accouchement, bring on a fever more or less intense, the diagnosis of which may embarrass the physician. The antecedents of the patient, the absence of a chill at the outset of the fever, the normal condition of the genital organs, the lochia having no fœtid odor, and, finally, the localization which follows after a certain time in one or the other disease, will make the diagnosis clear.

Malaria, whether it has previously existed or contracted only at this time, may sometimes cause a doubt. The size of the liver, the antecedents, and the action of the sulphate of quinine, will clear up the doubt. Syphilis also, under the influence of traumatism caused by accouchement, may give rise to feeble thermic elevation of some hours' duration and be mistaken for the onset of septicæmia.

Stercoremia. The reabsorption of the toxic principles of fæcal matter, in females suffering from constipation, may sometimes cause, after accouchement, a light fever, calling for a purgative or simply for an injection.

Prognosis.—The gravity of the prognosis will vary:

With the form of the disease; the more localized the septicæmia the better its prognosis.

With the period of its beginning; in general the prognosis is better in proportion as the onset is distant from the moment of accouchement.

With the intensity of the fever; the more pronounced the thermic elevation, the more grave is the prognosis.

With the surroundings of the patient; if the case is isolated it has more chance of being benign. In a series of successive contagions, the poison appears to gain intensity.

With the treatment; the majority of cases of septicæmia (except those generalized at first), well treated, should be cured.

Treatment.—So far as prophylactic treatment is concerned it will be understood that the antisepsis must be perfect in relation to the attendants, physician and nurse, to the instruments, and to all the surroundings of the patient.

With regard to the post-partum three circumstances may present—the normal state, a menace of septicæmia, and finally a fully established septicæmia.

1. *Normal state.*—Vulvar toilets are sufficient unless there is reason to doubt the asepticism of the genital organ, when vaginal injections will be necessary, one to two a day, with a carbolic (1–50) or a boracic (3–100) solution. These injections should be given by the physician or by an intelligent nurse who understands how to avoid the penetration of air.

2. *Menacing septicæmia.*—Whenever we have present:

Retention of a portion of the appendages (placenta, ovuline membranes);
Cephalalgia;
Fetidity of the lochia.

It is necessary to fear the appearance of septicæmia and to take measures to prevent its development. In such cases frequent vaginal injections will be given, two to four in twenty-four hours, with one to two litres of a carbolic solution, 1–50.

If the lochia is fetid and if, in spite of repeated vaginal injections, the odor persists, it is necessary to have recourse to intrauterine injections, repeated twice a day until the normal state returns.

3. *Declared septicæmia.*—As soon as septicæmia is declared, that is, after the appearance of the chills and of the fever, the treatment is nearly the same in all forms, except the mammary, which is usually slight, only requiring local care, and except the special forms which will not be taken into consideration here.

The indication is threefold: To clear the genital surface of microbes, genital medication; to prevent the penetration of microbes into the organism, abdominal medication; to aid the organism in its struggle, general medication.

4. Physician, midwife, nurse. Absolute cleanliness of person and of the clothing is indispensable with everyone attendant upon a puerperal patient.

Clothing which has been in any place where there has been contagious diseases of any kind, a cadaver, the debris of putrefaction, should never be brought near to a parturient woman, at least, not without thorough disinfection. The physician should also distrust spots of blood, of amniotic or other fluids, which, soiling the clothing, may render them septic. I need not insist upon the cleanliness of the person and of the details of the toilette, the importance of which can be readily understood, particularly for the woman called to take care of a parturient. The antisepsis of the hands should be particularly vigorous; the nails should be short and thoroughly clean. Before all genital examinations the hands should be washed, rubbed, soaped, rinsed, and bathed in an antiseptic liquid, preferably the $\frac{1}{1000}$ solution of the bichloride of mercury; all digital examinations should be made with the finger dipped in this antiseptic solution and covered with vaseline.

A physician who has had charge of a contagious disease, a puerperal septicæmia, opened an abscess, made an autopsy, examined a cancer, cannot without disinfection assist an accouche. Some authors have judged it necessary to impose a veritable quarantine. But, in general, it is considered sufficient to-day if a physician makes a complete change of his clothing: taking a bath and carefully washing his hands. All accoucheurs affected with suppuration of any kind (abscesses, periostitis, otitis, etc., etc.) shouln not practice their profession until cured, for fear of causing septicæmia in their patients.

5. All instruments brought into contact with the genital organs of the woman should be made rigidly antiseptic. Metallic instruments (forceps, embryotomes, sounds, etc.) may be sterilized by being kept immersed for a quarter of an hour in boiling water, or by passing them through the flame of an alcohol lamp; also, by washing and scrubbing with an antiseptic solution (the solution of the bichloride of mercury should be employed only where the instruments are nickel-plated), but this is not so good as the preceding methods.

Instruments in rubber, caoutchouc, celluloid, glass (sounds, canulas, etc.) should, as far as possible, be used when new only, but when used again should be immersed for a half hour at least in a strong antiseptic solution (phenic acid $\frac{1}{50}$, bichloride of mercury $\frac{1}{500}$).

6. The woman.

A. During pregnancy. In the case of genital hæmorrhage (placenta prævia, abundant purulent vaginal discharge, vegetations, fœtal maceration) it is necessary to redouble precautionary measures and have recourse to regular toilettes. At the least indication of renal complication, preference should be given to the bichloride of mercury, for at this time the danger of absorption by genital wounds does not exist.

B. Labor. The antiseptic care given during labor will be greatly increased by the presence of a pathological condition.

C. Deliverance. During deliverance the physician will abstain, as far as possible, from digital examination, and, as a rule, from all exploration of the genital organs. After delivery, make a toilette—vulvar, if the condition is normal and there is no doubt of the antiseptic condition of the genital organs; vulvo-vaginal, in a contrary condition; finally, vulvo-vagino-uterine, if there is a pathological condition, maceration, fœtal putrefaction, placenta prævia, etc., or intervention, forceps, version, artificial delivery, made in the belief that some septic element may have penetrated into the uterine cavity. At this time the bichloride of mercury should not be used on account of the numerous wounds of the genital surfaces which facilitate its absorption, but a phenic acid solution $\frac{1}{100}$, or a boric acid solution $\frac{1}{25}$.

D. *Post-partum.*—1. Normal condition. Vulvar trillettes are sufficient, unless there are doubts of the aseptic condition of the genital tract, in which case recourse should be had to vaginal injections, one or two a day, of phenic acid or boracic acid solutions. These injections should be made by the physician himself or by an intelligent nurse who can avoid the injection of air and who understands the principles of antisepsis.

Genital medication.—In cases where the septicæmia is clearly of vulvar origin, we may be content with vulvar and vaginal lavages, repeated two to four times a day, with carbolic acid, 1–50, or with bichloride of mercury, 1–2000, and with dusting the vulva with iodoform. But most often intra-uterine asepsis must be assured by the use of injections into the cavity of the uterus. The importance of this uterine toilet is capital and merits emphasis. I shall successively describe the classic intra-uterine injection and then the improvements that I believe are necessary to give this injection its requisite efficacy, the perfected intra-uterine injection.

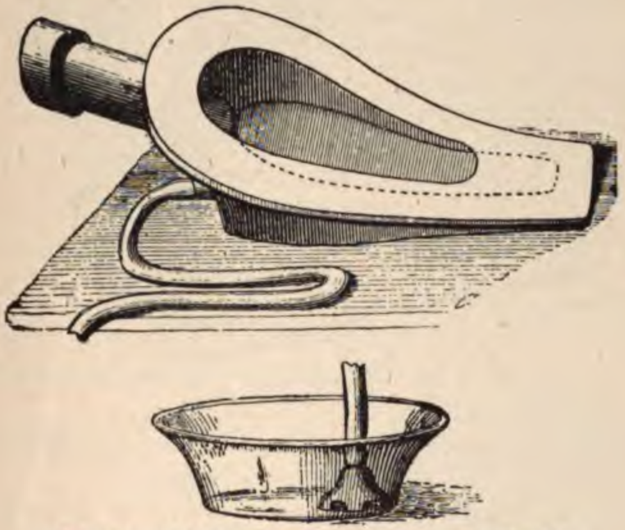

FIG. 304.—Metallic basin for abundant vaginal irrigation.

Classic intra-uterine injection.—The best intra-uterine sound for this purpose is that recommended by Budin ( ). The woman is left in her usual position, a basin (Fig. 304) is slipped under the buttocks. This basin is provided with a discharge tube which permits a prolonged injection. After having cleansed the vulva and vagina the extremity of the sound, previously dipped in vaseline, is directed on the finger of one hand through the vagina to the external orifice of the uterus. From this moment the instrument is pushed in the supposed direction of the uterine canal. When the sound has passed the external orifice it meets at three, four, or five centimetres a first obstacle, which is the internal orifice in the process of reformation. The obstacle is constituted less by the narrowness of the orifice than by the angle formed by the uterine wall (Fig. 305). After this obstacle a second is met, some centimetres farther; this is the uterine circle, and when it is passed the sound penetrates to the fundus of the uterus without difficulty.

When the sound has penetrated to the fundus a variable quantity of liquid is allowed to flow through it. It is well to use several litres of an antiseptic solution (ten to twenty litres).

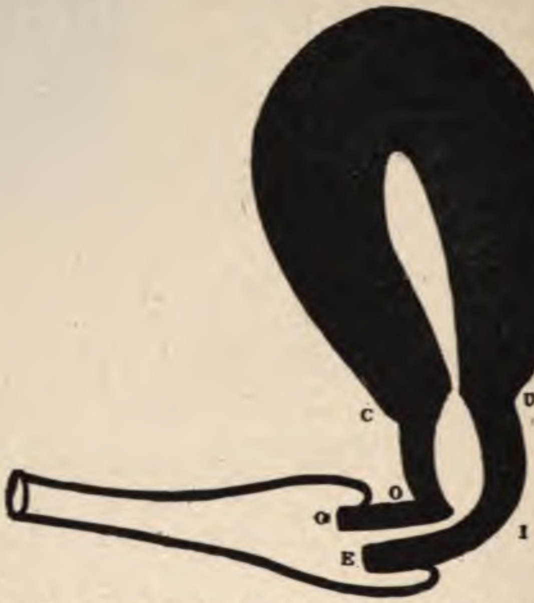

FIG. 305.—Post-partum uterus and vagina. C U, uterine circle; O I, internal orifice; O E, external orifice.

The perfected intra-uterine injection.—Against the classic intra-uterine injection three objections may be urged:

1. It is often difficult to introduce the sound on account of the obstacles created by the internal orifice and by the uterine circle. Sometimes it is even impossible to introduce it. Thus many physicians, even though experienced, find it impossible to penetrate beyond the internal orifice or the uterine circle.

2. The curved direction of the genital canal, incompletely corrected by the sound, obstructs the return of the liquid.

3. The simple contact of the liquid alone is not sufficient to completely cleanse the uterine surface, the friction of a solid body is indispensable for this effect.

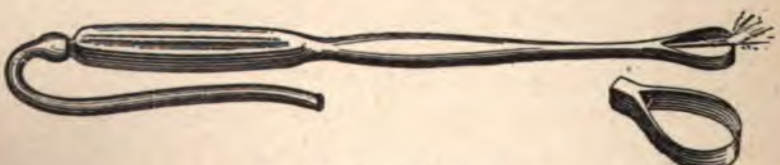

FIG. 306.—Irrigating curette.

To remedy these disadvantages I use an irrigating curette (Fig. 306) perforated through its length by a canal which allows the use of an antiseptic liquid. The terminal ring is sharp on one side, blunt on the other. The malleability of the instrument allows it to be curved at will. To use this irrigating curette in the cleansing of the uterine canal, I proceed as follows:

The patient being placed in the obstetrical position, after a vulvar and vaginal toilet, I grasp, under guidance of the index finger, the anterior lip of the cervix, and, if necessary, the posterior, with a vulsellum. The uterus is then lowered by drawing on the vulsellum and by having an assistant support the fundus through the abdomen. The irrigating curette is now introduced into the uterus by guiding it with the finger. According to the intensity of the curetting that is desired, the uterine surface is scraped, from above downward, with the blunt side or with the sharp side of the instrument. A tour of the uterine cavity is thus made and then the cervix is treated in the same way. In terminating, a large quantity of liquid (two to three litres) is allowed to flow, without withdrawing the curette, to complete the cleansing of the uterine cavity and to insure the exit of all the detached debris.

Made in this way, uterine cleansing, besides securing complete asepsis, presents a double advantage:

First, that of facilitating the penetration of the instrument to the fundus of the uterus, for in drawing on the cervix the curve of the uterine canal is straightened (Fig. 308).

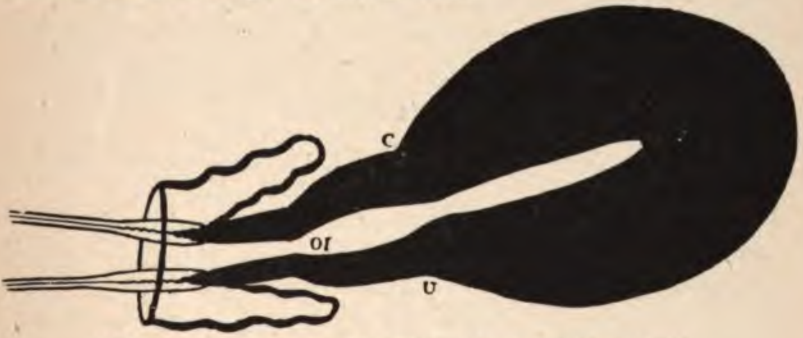

FIG 308.—Uterus drawn to the vulva by the use of the vulsellum, C U, uterine circle; O I, internal orifice.

Second, that of facilitating the return of the liquid and thus preventing its penetration into the peritonæum through the tubes. The same mechanism which so easily allows the entrance of instruments removes all obstacles to the reflux of the liquid.

The classic intra-uterine injection, copiously given, will suffice in a certain number of cases, but I believe it more prudent to have recourse at once to the perfected intra-uterine injection that I have described.

Whatever means may be employed to irrigate the uterine cavity it is necessary to remember that during the injection suffocation, syncope, and even death may occur. These accidents have been attributed by some authors to the penetration of the fluid injected through the fallopian tubes to the peritonæum ; by others, to the passage of the fluid through the uterine veins into the general circulation ; and finally, by still others to reflex action of which the starting point is the uterus. The experience of Tessier is in favor of the hypothesis of venous penetration, which appears to be the most rational. In all cases, to avoid these accidents, it is necessary: (1) to inject a feebly antiseptic fluid—boiled water will sometimes be sufficient ; (2) to cause the liquid to enter the uterine cavity slowly, not elevating the receptacle more than 50 centimetres above the uterus ; (3) assuring the outward flow of the fluid either by the use of a tube having a double current or, preferably, by drawing the neck of the uterus close to the vulva.

Abdominal medication.—Two measures, ice on the abdomen or a large vesicatory.

The ice is preferable. It is enclosed in a rubber bag and applied on the abdomen by interposing a double layer of flannel, to avoid echars from freezing. The sack is kept in place by a belt around the abdomen. The ice should be changed every two or three hours.

A large vesicatory will replace the ice in cases of necessity.

The ice, by lowering the temperature of the genital organs, retards the multiplication of the germs and impedes their penetration into the organism. Besides, it is a powerful sedative against the abdominal pain.

The vesicatory acts in the same way by the revulsion that it causes. But its action is less salutary and less complete.

Leeching and cupping has been advised in some cases.

General medication.—Tonics and antithermics are the two principal indications. The best tonics are alcohol, milk, if tolerated, and ether in subcutaneous injections, in cases of collapse. As antithermics, sulphate of quinine (1 gramme to 1.5 gramme) and antipyrine (1 to 2 grammes) are administered.

I do not speak of the special indications which may occur in consequence of the formation of purulent collections (suppuration of the broad ligaments of the iliac fossæ, etc.). Local treatment will be the same, then, as in suppuration of these regions produced by causes other than puerperal septicæmia.

CHAPTER XVII.

PUERPERAL PATHOLOGY.—EXTRA-GENITAL LOCALIZED DISEASES.

A. *Nervous system.*—A passing delirium sometimes occurs during labor if it is painful or prolonged. This disturbance of the cerebral function is due, without doubt, to the intensity of the painful phenomena. It disappears after accouchement.

Under the influence of the puerperal state, much more often after delivery than during pregnancy, there is observed a veritable insanity (mania or melancholia), of a variable prognosis, and which may persist after the cessation of the puerperal state. Mania is sometimes the consequence of eclampsia. Septicæmia does not appear to play any pathological role here. It has been pretended that pregnancy may exercise a fortunate influence on an already existing mania. Alienation of puerperal cause does not require any special treatment. There exists no indication to provoke abortion or premature accouchement.

Various neuralgias, notably odontalgia, are produced or aroused by pregnancy. Treatment: to avoid any operation on the teeth during gestation; general or local narcotics.

Lumbo-abdominal neuralgia is especially manifest. It is due to the uterine contractions. Treatment: laudanum or viburnum, internally; morphine in subcutaneous injections.

Women often complain of cramps in the calves of the legs. During pregnancy the pains in these regions are due to the venous distention, and are relieved by the horizontal position or by gradual compression. During accouchement these pains sometimes take a great intensity, and are caused by the compression of the nerves supplying these regions. An energetic massage is the only means of producing some relief.

Hemiplegias, paraplegias, paralyses, or partial pareses, may be observed during pregnancy, due to their usual causes, and more often to hæmorrhages of the nervous system than to albuminuria.

The influence of the puerperal state on hysteria is variable according to the woman. Hysterical attacks are, fortunately, rare during labor, for they singularly disturb the period of expulsion and of delivery of the appendages. In hysterical subjects hypnotism might be employed during the period of dilatation. During expulsion it would be useless and sometimes dangerous.

Epilepsy, although variously influenced by pregnancy, is most often benefited. The treatment by bromide of potassium, even in strong doses, is advised, for it presents no danger to the fœtus.

Chorea may appear or reappear during pregnancy. Usually it persists to the moment of accouchement, when it assumes a great intensity. It most often ceases after labor. During pregnancy it should be treated by chloral, by bromide of potassium and by morphine. During labor, chloroform should be given to quiet the convulsions, in case of need. In some cases of grave chorea, digital dilatation of the cervix or induced expulsion will be indicated.

B. *Respiratory system.*—Bronchitis with a particularly tenacious cough may favor or determine abortion. It requires the usual treatment.

Pneumonia, occurring during pregnancy, causes premature expulsion in about one-half the cases. The prognosis for the mother and for the pregnancy is serious in proportion as gestation is advanced. It is impossible to say whether the premature expulsion of the ovum exercises a favorable or an unfavorable influence on the disease. The treatment should be the same as when pneumonia occurs without pregnancy. Antimonium may cause expulsion of the ovum, or contribute to the expulsion, but the gravity of the prognosis relegates this consideration to a secondary consideration. If the woman is in labor, accouchement should be terminated as promptly as possible.

Pleurisy rarely exercises an unfortunate influence on the course of pregnancy and this disease does not seem to be aggravated by the existence of the puerperal state. The treatment is the same as if pregnancy did not exist.

C. *Circulatory system.*—The heart, under the influence of pregnancy and of accouchement, is subject to overwork which produces an hypertrophy of the left side and a dilatation of the right side. Now, if this organ was diseased previous to conception, grave disorders may result. The puerperal state may be the cause of two varieties of cardiopaths: One, acute endocarditis, almost always occurs during the post-partum and is only a localization of puerperal septicæmia; the other, subacute or chronic endocarditis, resulting from pregnancy, terminates in the definite formation of a valvular lesion. Besides these two varieties, the puerperal state causes myocarditis exceptionally, and fatty degeneratte frequently.

Disease of the heart quite frequently causes abortion or premature delivery. The frequency of this premature expulsion varies according to the following results obtained by Porak:

	Frequency of Premature Expulsion.	Maternal Mortality.
Aortic lesions	25 per 100	23 per 100
Mitral lesions	42 "	45 "
Complex lesions	43 "	50 "

Treatment.—Preventive: For a cardiopath, dissuasion from marriage; if married, no children; if children, no lactation. Curative: The ordinary medical treatment, digitalis, milk, diuretics. In grave cases, provoked abortion or premature delivery may be indicated.

The peripheral circulatory system is subject to varices in one-quarter of the primiparæ and one-half of the multiparæ. They sometimes begin with pregnancy, but are especially marked toward the middle or toward the end. The obstruction of the circulation produced by the development of the uterus, the augmentation in the quantity of blood during pregnancy and perhaps a reflex action arising from the uterus, explain their production.

When the child succumbs during the course of pregnancy, the varices are effaced (Budin, Rivet). This is an interesting sign of the death of the fœtus. Among the complications may be noted œdema, eczema, ulceration, phlebitis, and finally, rupture, which may give rise to fatal hæmorrhage. Treatment: Repose in the horizontal position; moderate compression with an elastic bandage.

The cervix or the vagina may become varicose but the vulva is the favorite seat of varices. The varices often rupture spontaneously, or in consequence of a traumatism, and give rise to grave hæmorrhages. Treatment: Horizontal repose. Slight compression. In case of rupture, digital compression, forci-pressure, ligature.

Hæmorrhoids seem independent of the varices of the lower limbs and of the genital organs. They are observed during pregnancy when the constipation is obstinate. Treatment: Laxatives, repose, baths, cold cataplasms, sedative suppositories, exceptionally surgical dilatation of the anal sphincter.

Phlegmasia alba dolens.—Under this term has been designated venous coagulation of the lower limbs. The cause is, as we have seen in studying puerperal fever, sometimes a septicæmic phlebitis, sometimes a phlebitis, of an undetermined nature, but which seems, however, not to be related to septicæmia. Whiteness, hardness, and painfulness, are the three characters of the œdema produced by this affection. The onset usually takes place about the fifteenth day of post-partum. The duration is from one to three months. The length of the disease is due to the coagulation of the blood, the clots absorbing slowly. It is very important to keep the patient in a recumbent position until the resorption and the disappearance of the clots, on account of the danger of pulmonary œdema and of sudden death. Treatment: In the beginning, quinine or antipyrine against the febrile element; vesicatory on the painful points of the lower limbs; to place the limb in a trough and envelop it in compresses soaked in a borated solution; to replace the moist dressing by a dry dressing (simple wrapping with cotton) as soon as the inflammation has disappeared, recognized by the cessation of the pain and fever; to keep the patient in a horizontal position until the danger from embolism has passed. The limb should be enclosed in an elastic bandage for about six months, or more if swelling follows when it is removed.

D. *Digestive system.*—Pregnancy sometimes produces abundant salivation which is observed especially at the beginning, and which is rebellious to all treatment, except to atropine in the dose of a milligramme.

Gingivitis occurs by preference in the second month of pregnancy. Care should be taken with the cleansing of the mouth and there should be applied on the free border of gums a solution composed of equal parts of spirits of cochlearia and of hydrate of chloral.

The vomiting of pregnancy becomes *grave* when it is capable of altering the general health of the woman. It is *incoercible* when it resists the greater part of the usual methods employed to oppose them. A great number of procedures have been tried against incoercible vomiting, sometimes in vain, sometimes with success, so that it is impossible to be exclusive. It is necessary to attempt, in turn, all the means advised until the efficacious agent is found, and if all fail to have recourse to the uterine treatment I shall indicate in terminating. It is important to distinguish the cases where there exists with pregnancy an affection capable of determining the incoercible vomiting from those in which all special ætiological ideas are wanting.

When there exists a casual disease the appropriate treatment will be directed to its removal. When there exists no appreciable cause the procedure then consists in successively attempting the various means enumerated as follows:

1. *Various remedies.*—Variation in the aliments. Alcohol. Alkalies. Ice internally. Milk diet. Purgatives. Emetics. Bismuth. Iodide or bromide of potassium. Valerianate of cerium. Oxalate of cerium. Lavage and gavage of the stomach. Nutritive enemas. Forced journeys.

2. *Sedatives.*—Opiates. Hydrochlorate of cocaine. Hydrate of chloral.

3. *Excitants.*—Inhalations of oxygen. Electricity.

4. *Revulsives.*—Ether spray over the stomach. Ice on the epigastrium, or on the spine. Vesicatory or leeches on the epigastric region.

5. *Uterine treatment.*—(a) Applications to the cervix of belladonna, of cocaine, of leeches. Cauterizations of nitrate of silver or with the thermo-cautery. (b) Digital dilatation of the cervix by Coperman's method. The finger is introduced into the cervix to the internal orifice, that is opened; then attempt is made to dilate the cervix by a circular movement of the finger, and to detach the membranes as far as possible. This method should only be attempted

if the preceding means fail, as it may cause abortion or premature labor. (c) Abortion and induced accouchement. Finally, in cases resisting all therapeutic measures and where life is threatened, we should have recourse to the induction of abortion or of accouchement by employing the measures that will be indicated later.

Constipation is the rule during pregnancy. This will be combatted by the usual means, avoiding all energetic and drastic purgatives. Diarrhœa is the exception; however it may become incoercible in some cases and determine abortion and even the death of the patient, without the autopsy revealing any lesion of the intestine that explains the gravity of the disease.

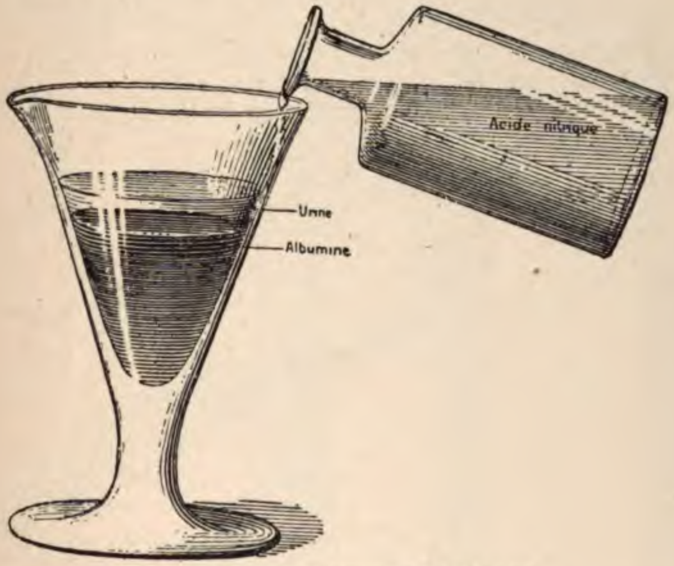

FIG. 309.—Test for albumen with nitric acid.

E. *Appendages of the digestive system.*—Hypertrophy of the thyroid is the rule during pregnancy. It diminishes after accouchement without resuming its former dimensions. Fatty degeneration of the liver is also the rule during pregnancy. Simple icterus may cause the death of the fœtus or its premature expulsion. Grave icterus occurs with its usual symptoms. Pregnancy by the retardation that it imposes on combustion is also a great cause of hepatic colic.

F. *Urinary system.*—Albuminuria is not a disease but a symptom constituted by the presence of albumen in the urine. Its importance in the puerperal state is considerable on account of its frequency and of the danger of eclampsia that it threatens. Albuminuria is recognized by the examination of the urine. Among the different means of detecting its presence, we have the nitric acid test, which is expeditious but not sensitive (Fig. 309); heat and nitric acid, which is more certain (Figs. 310 and 311), and Esbach's procedure. In the last method the reagent intended to precipitate the albumen is a mixture of nine volumes of picric acid with one volume of acetic acid. A tube specially graduated (Fig. 312 *a*) is filled with urine to U, and with the reagent to R. The mixture is made by closing the tube with the thumb and shaking. The tube is finally closed with a rubber cork and left for twenty-four hours. At the end of this time the lower graduation allows us to read the quantity of albumen deposited (Fig. 312 *b*) indicating the amount contained in a litre of urine.

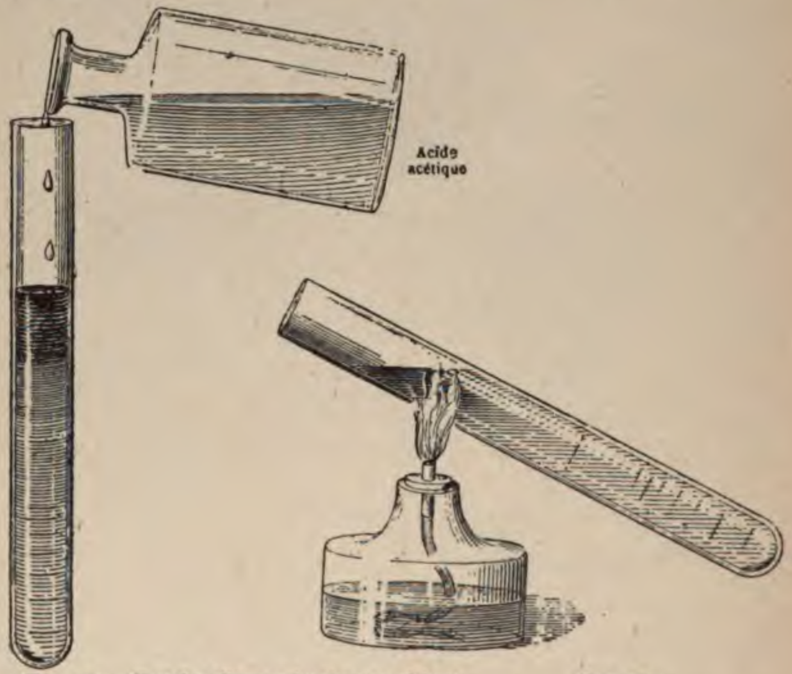

FIG. 211.—Test for albumen by the use of heat. FIG. 310.

Albuminuria, either directly or through the complications that it produces (utero-placental hæmorrhage), may obstruct the development of the ovum, cause the death of the fœtus and prevent pregnancy from arriving at normal term. Albuminuria also predisposes to the genital hæmorrhages. But the result most to be feared is eclampsia which threatens the pregnant woman.

The treatment will vary according to the variety of the albuminuria. In the case of febrile, cachectic or cardiopathic albuminuria, the presence of albumen in the urine is only of secondary importance and the treatment should be directed against the casual affection. But if the albuminuria is of renal, or even simply of gravid origin, the vice of secretion produces a fear of eclampsia and the efforts must be directed to the endeavor to re-establish elimination or to supplement it by other ways. The treatment then presents a close analogy with that of eclampsia, except that the minor therapeutic tripod here holds the preponderating importance. The minor tripod consists, as in eclampsia, of diuretics, purgatives and diaphoretics. With regard to the major tripod, bleeding will only be employed in exceptional cases and when eclampsia is imminent. Under anæsthetics, Noeggerath has noted the beneficial influence of hydrate of chloral on albuminuria. This success should encourage its use. Uterine depletion consists of inducing abortion or accouchement, in very exceptional cases, when, in spite of the employment of the preceding measures, there is reason to fear the death of the patient or a fatal eclampsia.

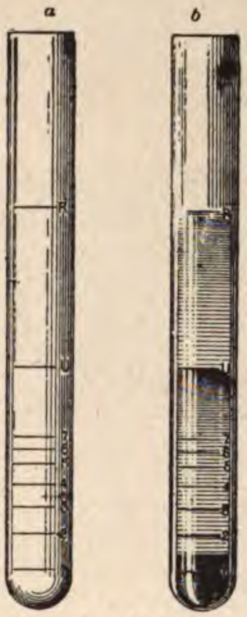

FIG. 312.—Esbach's graduated tubes. *a*, empty; *b*, filled, the precipitate being deposited.

G. *Regions.*—Pregnancy aggravates the majority of the cutaneous diseases. Under the influence of gestation an intense generalized pruritus may develop, sometimes without lesions, sometimes accompanied by vesicles and pustules. Treatment: alkaline baths, lotions of cocaine solution.

The result of traumatism during pregnancy is variable. In general, traumatism, accidental or operative, is dangerous, with regard to the interruption of pregnancy, in proportion as it approaches the genital sphere. In the union of fractures the formation of the callus is often retarded, but the cicatrization of wounds in general is not interrupted by pregnancy.

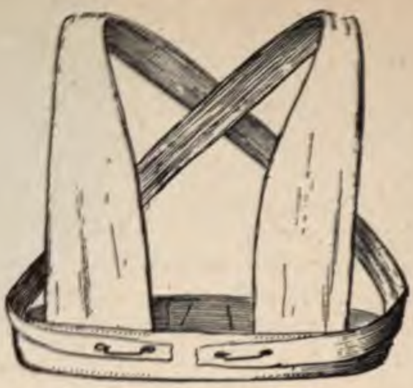

FIG. 313 —Mammary bandage.

An abscess of the breast is exceptional during pregnancy. It may be produced, however, under the influence of traumatism, of excoriation, or of eczema of the nipple. There are no special therapeutic considerations.

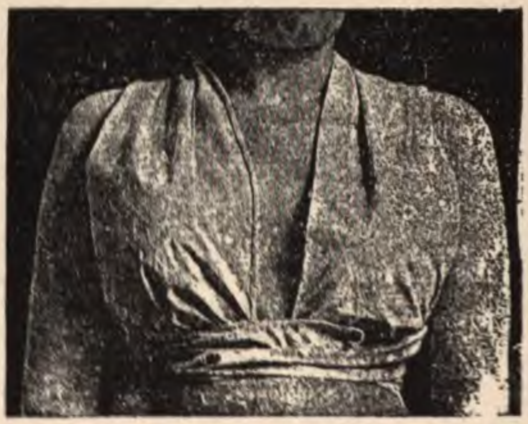

FIG. 314.—Mammary bandage applied.

Hypertrophy, simple exaggeration of the normal increase due to the gravid state, may be observed. This hypertrophy exists some times to a very marked degree. After accouchement the breasts return to nearly normal size. Sometimes this regression is so slow that lactation is impossible. The various means of treatment that have been advised are ineffectual. It is necessary to be content with a simple support given by an appropriate bandage (Figs. 313 and 314).

CHAPTER XVIII.

DISEASES OF THE BONY PELVIS.

A. Diseases of the articulations.

I. *Relaxation of the symphyses.*—The three articulations which interrupt the pelvic ring are subject, during pregnancy, to a softening of their tissues that, fortunately, corrects the rigidity of the pelvis in view of accouchement. This physiological state may become pathological by excess. The three symphyses, then, are subject to a veritable relaxation, more easily appreciable at the pubes than at the sacro-iliac articulations. This articular relaxation is manifested by two important symptoms:

a. Functional weakness.—The woman feels an increasing difficulty in walking. She waddles in walking. It seems to her as if the thighs could no longer sustain the pelvis. Walking sometimes becomes impossible.

b. The pain relates to a general fatigue and to suffering at the articular interlines of the pelvis. Local pressure causes a most clear exacerbation.

By examination two signs are found which confirm the diagnosis:

1. *The abnormal mobility of the bones.*—The woman being in the upright position, the finger in the vagina is brought into relation with the symphysis pubis. Then, when the patient raises the limbs alternately, an independent movement of the two articular surfaces is very clearly felt.

2. *Articular crepitation.*—This crepitation, analogous to that met in an old arthritis, only rarely exists in relaxation of the symphyses. The relaxation generally begins at a variable period of the second half of pregnancy and is marked up to the moment of accouchement. Cure occurs after delivery but the relaxation sometimes persists a long time. The consolidation of the articulations may even remain incomplete.

Relaxation of the symphyses is a relatively frequent complication of the puerperal state, but it often remains unrecognized. The painful and functional disturbances of which it is the cause being simply and wrongly attributed to the pregnancy itself. An attentive exploration, based on the preceding signs, will permit an easy diagnosis.

The only efficacious treatment of this affection consists in the application of a bandage, a double circle around the pelvis, giving it artificial solidity. The best apparatus is Martin's belt, composed of a circle of steel, covered by soft material, which passes above the trochanters and buckles in front. This belt should be made to order and exactly molded to the contour of the body. Well made it is easily supported and overcomes the greater part of the inconveniences of relaxation of the symphyses. It should be worn until return of the articulations to their normal state.

II. *Inflammation of the articulations.*—Inflammation of the pelvic symphyses may be produced in three principal conditions:

1. In consequence of relaxation of the symphyses, the inflammation becoming a complication.
2. In consequence of rupture of an articulation any obstetrical traumatism (forceps, version, difficult labor) may act in the same way, even when it does not produce a complete rupture of the symphysis attacked, and where it is confined to a simple contusion.
3. Under the influence of the puerperal state; an influence admitted when no other cause can be found (perhaps of rheumatismal nature).

This arthritis, attacking one, two, or all three symphyses of the pelvis, is manifested by a fever of variable intensity and locally by pain and doughyness of the diseased articulation. When inflammation is a consequence of relaxation or of rupture the symptoms of these different affections are confused and make diagnosis more complicated.

Termination takes place by cure, in a few days, or by transformation into a chronic state, or by suppuration.

The prognosis naturally varies according to the intensity of the disease.

The treatment is the same as that of arthritis in general. It is useless to dwell on it here. Repose and immobilization of the pelvis constitute its basis.

III. *Rupture of the symphyses.*—When there is a disproportion between the size of the fœtal head and the space presented by the pelvic passage, if the accoucheur (forceps, manual extraction) or the utero-abdominal contraction energetically force the exit of the child, there may result a fracture of the fœtal cranium, or, more often, a rupture of one of the pelvic symphyses.

The symphysis pubis is rarely affected. Usually it is one of the sacro-iliac symphyses that suffers. This is easily explained by the energetic pressure on the sacrum.

At the moment of this rupture the woman feels an acute pain, a sensation of tearing; the obstetrician perceives crepitation and the feeling of an obstacle suddenly overcome, analogous to that given by the passage of the head through the narrowed promonto-pubic diameter when it falls into the excavation.

Articular rupture, which is only a pronounced sprain, terminates in inflammation. The consequences of the accident are those of arthritis with a veriable progress according to its intensity. The treatment is the same as that of arthritis.

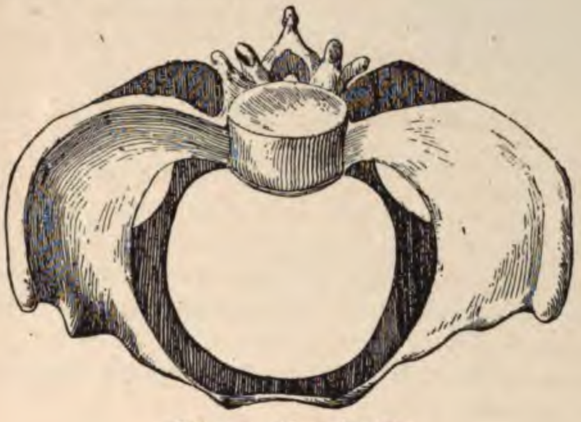

FIG. 315.—Normal pelvis.

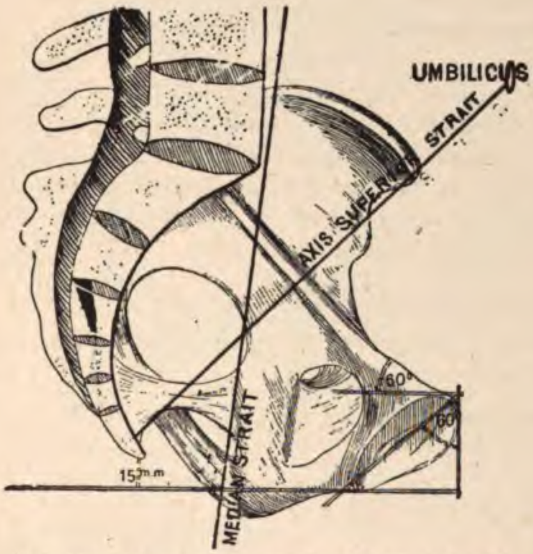

FIG. 316.—Antero-posterior section of a normal pelvis.

B. Pelvic deformities.—The normal conformation of the bony pelvis (Figs. 315, 316) has already been considered, it is useless to review it here. The pelvis is deformed whenever, by its conformation or by its direction, it deviates from the normal state. The pelvic deformities can be divided into four classes:

I. *Deformities of amplitude.*
  1. Pelvis too large.
  2. Pelvis too small.

II. *Deformities of length.*
  1. Pelvis too long, too deep.
  2. Pelvis too short.

III. *Deformities of direction.*
  1. Pelvis in anteversion.
  2. Pelvis in retroversion.
  3. Pelvis in lateroversion.

IV. *Deformation of continuity.*
  1. The cleft pelvis.

We shall successively study:

A. The pathological anatomy, that is, the conformation of the deformed pelvis and at the same time the ætiology and pathogeny.
B. The symptomatology, that is, the symptoms produced during the puerperal state.
C. The diagnosis.
D. The prognosis.
E. The management.

A. *Pathological anatomy; Ætiology; Pathogeny.*—I. *Deformities of amplitude.*—We shall not take into account the pelvis that is too large, for its importance in practice is nul. The narrowed pelvis, on the contrary, has a considerable importance on account of its frequency and of the obstacle to accouchement. Below is the classification I shall follow in its study:

A. *Pelvis with simple deformity.*

1. Viciation by general disease (antero-posterior contraction by preference).

   (a). Atrophy (atrophic pelvis). Frequency, 20 p. 100.
     1. Justo-minor.
     2. Flattened.
     3. Flattened justo-minor.

   (b). Rachitis (rachitic pelvis). Frequency, 60 per 100.
     1. Justo-minor.
     2. Flattened.
     3. Flattened justo minor.
     4. Star-shaped, figure-of-eight, exostotic.

   (c). Osteomalacia (osteomalacic pelvis). Frequency, 1 per 100.
     Star-shaped.

2. Viciation by local disease (transverse contraction by preference).

   (d). Sacro-iliac arthropathy (sacro-iliac pelvis). Frequency, 1 per 100.
     1. Simple ovular oblique pelvis.
     2. Double ovular oblique pelvis.

(e). Rachidian deviation (rachidian pelvis). Frequency, 10 per 100.
  1. Lordosic pelvis.
  2. Scoliotic pelvis.
  3. Cyphotic pelvis.

(f). Alteration of the lower limbs (crural pelvis). Frequency, 5 per 100.
  1. With simple coxo-femoral luxation.
     With double coxo-femoral luxation.
  2. Without luxation.

3. Viciation by invasion (irregular contraction).

(g). Spondylolisthesis (vertebral pelvis). Frequency, 1 per 100.
(h). Fractures (fractured pelvis). Frequency, 1 per 100.
(i). Tumors (neoplastic pelvis). Frequency, 1 per 100.

B. *Pelvis with complex deformity.*

Frequency nearly equal to that of simple deviations.

A. *Pelvis with simple deformity.*

(a). *Atrophy.*—Outside of rachitis, under an influence still undetermined but in which heredity plays an important role, individuals are seen whose body, or sometimes only a part (head, thorax, pelvis) is subject to an arrest of development. This atrophy, when it relates to the female pelvis, produces the deviation that we now study. This form of deformed pelvis may present three types of deviation.

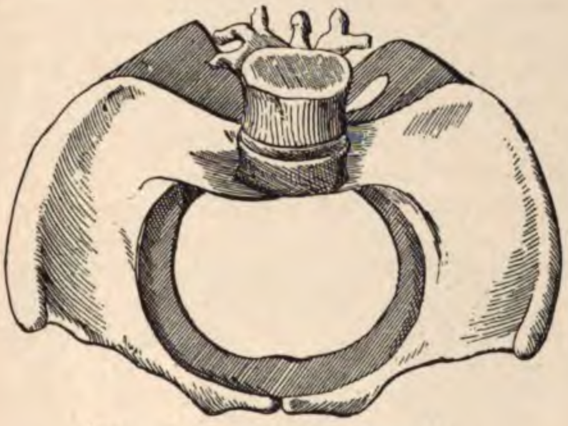

FIG. 317.—Atrophic justo-minor pelvis.

1. *Justo-minor.*—By this expression, that common usage has confirmed, and that is opposed to a justo-major (generally enlarged pelvis), is designated a pelvis (Fig. 317) in which all the diameters have been subjected to a diminution, or rather to a want of development. It is a pelvis generally narrowed, with perfect form.

2. *Flattened* (flattened atrophic pelvis).—This is also called Betschler's pelvis. Only the antero-posterior diameters are contracted, the transverse or oblique remaining normal or slightly enlarged. Let us take the preceding variety and push the sacrum forward toward the pubes, the curvature of the iliac bones is

increased by this, while the transverse and oblique diameters undergo a certain augmentation (Fig. 318).

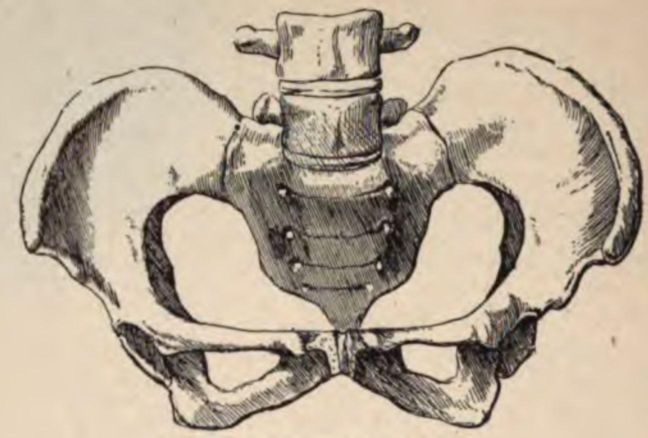

FIG. 318.—Flattened atrophic pelvis.

3. *Flattened justo-minor.*—Let us take a very pronounced justo-minor pelvis and, as before, push the sacrum forward. The result is the same, that is, diminution of the antero-posterior diameter, increase of the transverse and oblique. However, the latter, being primarily very narrow, cannot attain the normal dimensions and the pelvis remains contracted in all its diameters, but with predominence of contraction in the sacro-pubic direction (Fig. 319).

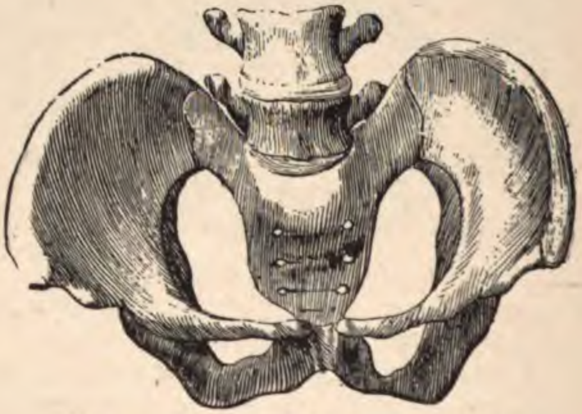

FIG. 319.—Flattened atrophic justo-minor pelvis.

(b). *Rachitis.*—This disease, occurring during the first two or three years of life, is characterized by a disturbance of the nutrition, and especially by a vicious evolution of the tissues which occurs with ossification. The bones, in place of having, from a normal calcification, their natural solidity, are soft and of little resistance, so that they curve and become deformed. Under the influence of rachitis pelvic deviations arise which have a great analogy with the preceding class although the varieties are more numerous.

1. *Justo-minor* (rachitic justo-minor pelvis)—As in the case of an atrophic pelvis the lack of development affects all the pelvis. There is a difference, however, as the contraction is especially pronounced at the superior strait (Fig. 320). There is at this level an *anular* contraction, this expression being opposed to that of *canaliculated*, as applied to stenoses affecting the whole of the bony canal.

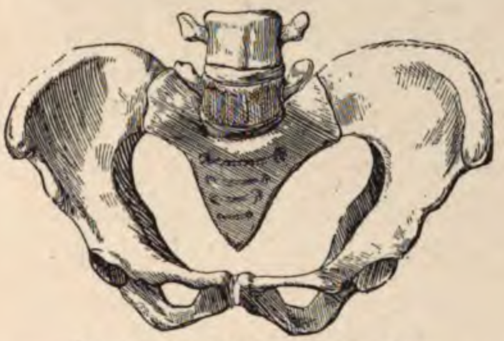

FIG. 320.—Rachitic justo minor pelvis.

2. *Flattened* (flattened rachitic pelvis).—As in the atrophic pelvis, it is the projection of the sacrum, and especially of the promontory toward the center of the pelvis, that causes the antero-posterior flattening (Fig. 321), and particularly promonto-pubic, at the same time with a relative increase, sometimes actual, of the oblique and transverse diameters. The promonto-pubic contraction is the characteristic of the flattened rachitic pelvis. This variety is the most frequent of all the pelvic deformities.

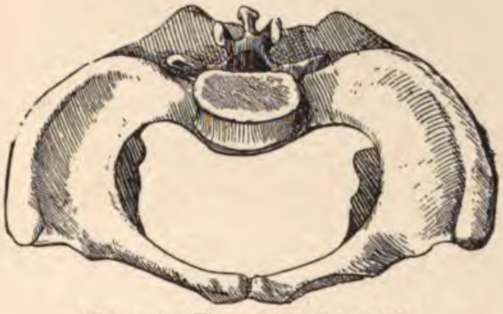

FIG. 321.—Flattened rachitic pelvis.

3. *Flattened justo-minor* (flattened rachitic justo-minor pelvis).—This is a combination of the two preceding varieties, which causes a contraction of all the diameters with predominence of the

shortening of the antero-posterior (Fig. 322). As in all the varieties of the rachitic pelvis, the stenosis involves especially the superior strait.

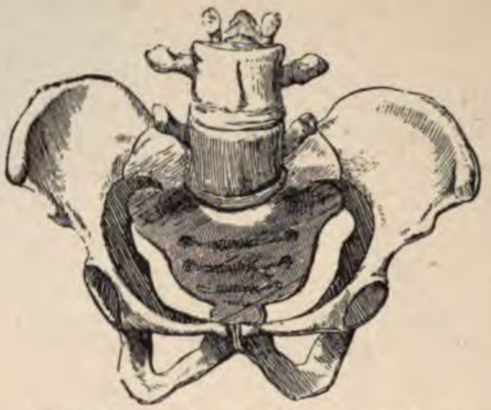

FIG. 322.—Flattened rachitic justo-minor pelvis.

4. *Rachitic pelvis* (in star-shape, in figure-of-eight, exostotic).—I have grouped in the same paragraph these three varieties of the rachitic pelvis as they are seldom seen.

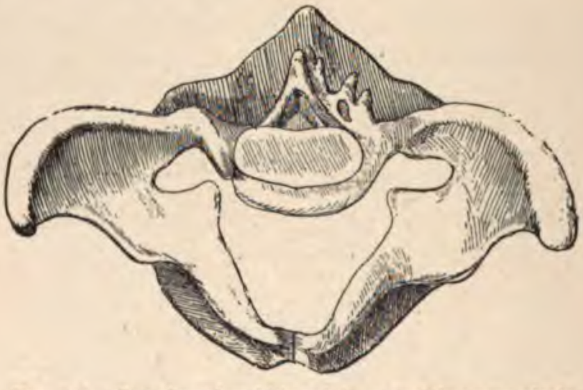

FIG. 323 —Star-shaped rachitic pelvis, or pseudo osteomalacic.

The star-shaped pelvis (Fig. 323), also called the pseudo osteomalacic, presents a deformation analogous to that produced by concentric pressure on the sacrum and the femoral heads. The form of the pelvis is almost that of a star of three rays.

The pelvis in the figure-of eight (Fig. 324) is constituted by a very marked approach of the sacrum and the pubes toward each other.

The exostotic pelvis is remarkable for a series of pointed spines, at the sacro-iliac symphysis, at the ilio-pectineal eminence, at the spine of the pubes (Fig. 325). These projections, depeloped under the influence of rachitis, are capable at the moment of accouchement of perforating the soft tissues.

Whatever the variety of the rachitic pelvis, the sacrum may present independent incurvations that are interesting to observe.

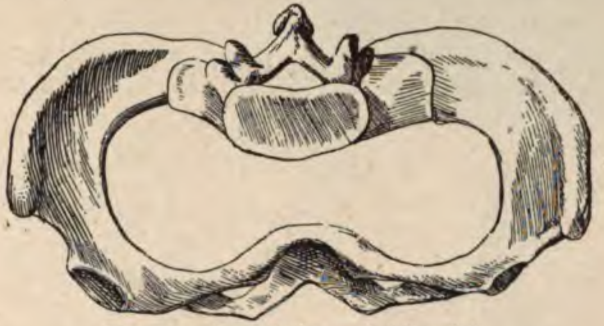

FIG. 324.—Rachitic figure-of-eight pelvis.

In some cases the curve is but little modified. Sometimes it is exaggerated (Fig. 326). Then a false promontory is constituted. In other cases the curve may be straitened, or even directed contrary to the normal, the convexity facing the center of the pelvis. A false promontory is also formed but in place of being lumbar, as before, it is sacral (Fig. 327) and found at the union of the first and second segment of the sacrum.

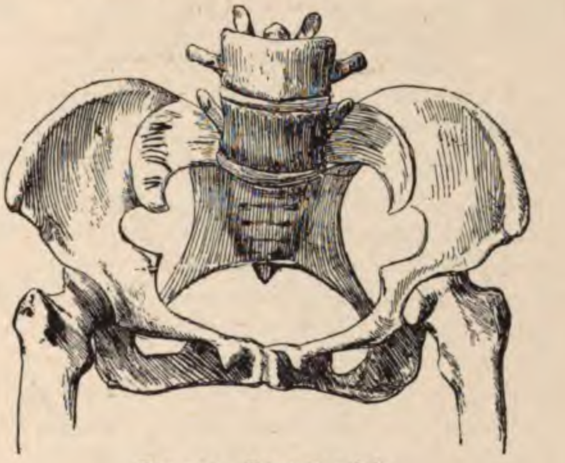

FIG. 325.—Exostotic pelvis.

(c.) *Osteomalacia* is a softening of the bony skeleton occurring during the adult period. It is analogous to rachitism, not in its lesions but in its results. It often takes its origin in pregnancy. This disease produces only one variety of pelvic deformity, the star-shaped pelvis (Fig. 328).

(d). *Sacro-iliac arthropathy.*—Under the influence of an affection of the right or left sacro-iliac articulation, sometimes of both, an affection not yet well determined, but which appears to be in some cases a vice of conformation, in others an arthritis of tubercular nature or of early age, there is formed a sacro-iliac ankylosis, with atrophy and resorption of the contiguous regions of the ilium and of the sacrum. The result of this disease on the configuration of the pelvis will vary according as a single articulation or both are attacked:

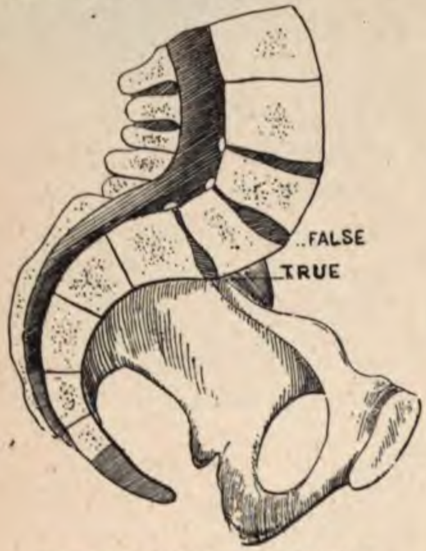

FIG. 326.—Rachitic pelvis with false lumbar promontory.

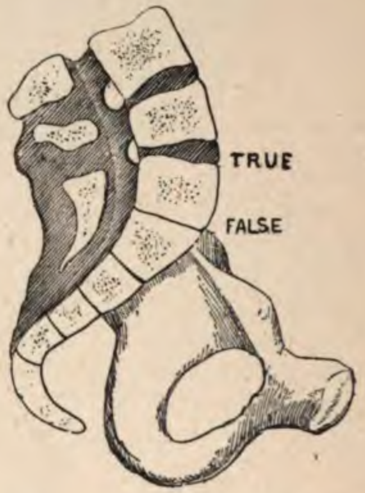

FIG. 327.—Rachitic pelvis with false sacral promontory.

1. *A single articulation attacked* (simple ovular oblique pelvis or Nægele's pelvis). *Unilateral sacro-iliac pelvis.*—The sacrum inclines from the ankylosed side. The diseased iliac bone inclines toward the center of the pelvis pushing the opposed ilium in the contrary direction, so that the symphysis pubis is carried toward the healthy side (Fig. 329). The superior strait takes the form of an oval with the long axis directed obliquely. The transverse and the oblique diameters are the most affected. The deviation equally affects the superior strait, the excavation and the median strait.

2. *Both articulations attacked* (double oblique ovular pelvis, or Roberts' pelvis). *Bilateral sacro-iliac pelvis.*—The ankylosis, occurring on both sides, causes a transverse approach of the iliac bones toward each other, the pubic symphysis remaining median, and pelvis symmetrical. However, the analogy with the preceding form gives it the name of double oblique, although, properly speaking, it is not oblique. The contraction is especially transverse (Fig. 330).

(e). *Rachidian deviations.*—We shall only take into question here the simple deformities produced by rachidian deviation exclusively.

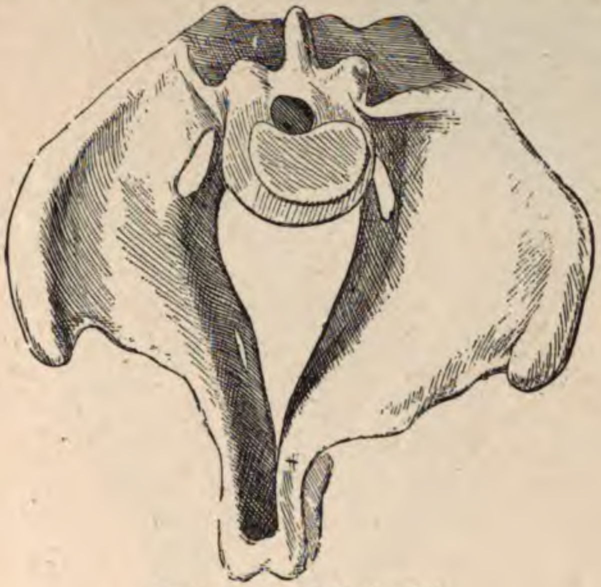

FIG. 328.—Osteomalacic pelvis.

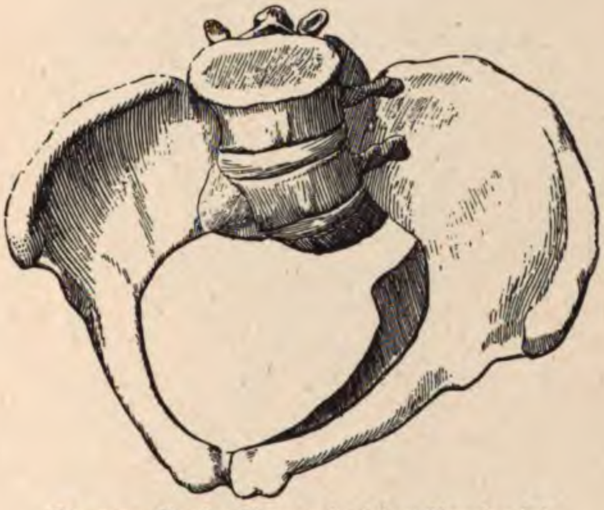

FIG. 329.—Simple oblique oval pelvis or Nægele pelvis.

1. *Lordosic rachitic pelvis*—Lordosis only affects the pelvis when it exists in the lumbar region, its most frequent seat. It does not act on the conformation of the pelvis, but simply on its inclination forward, which is marked (Fig. 331); there is pelvic anteversion.

2. *Scoliotic rachitic pelvis.*—The action of scoliosis on the pelvis may be multiplied by a simple lateral inclination or by an actual deformity. When deformity is present there is flattening of the lateral half of the pelvis toward which the deviated lumbar column inclines (Fig. 332).

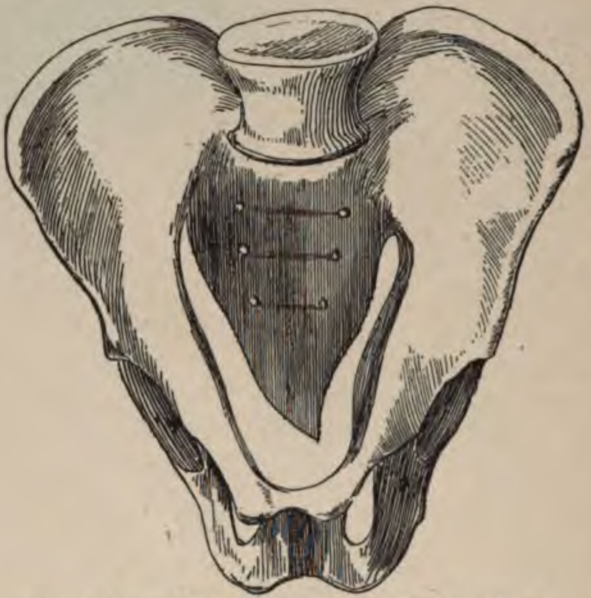

FIG. 330.—Double oblique oval pelvis or Roberts' pelvis.

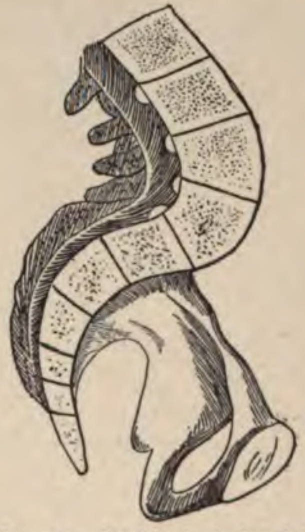

FIG. 331.—Rachitic lordosic pelvis.

3. *Cyphotic rachitic pelvis.*—This vertebral deviation is capable of causing, either an inclination of the pelvis backward, elevating the

symphysis pubis, approaching the plane of the superior strait to the horizontal, or a special and characteristic deformity which gives the pelvis the form of a funnel (Fig. 333).

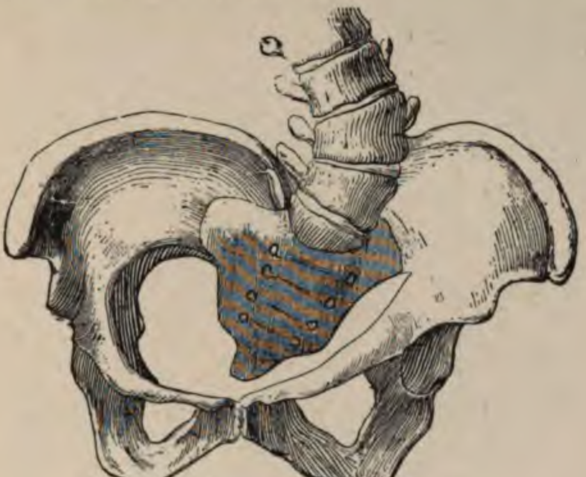

FIG. 332.—Rachitic scoliotic pelvis.

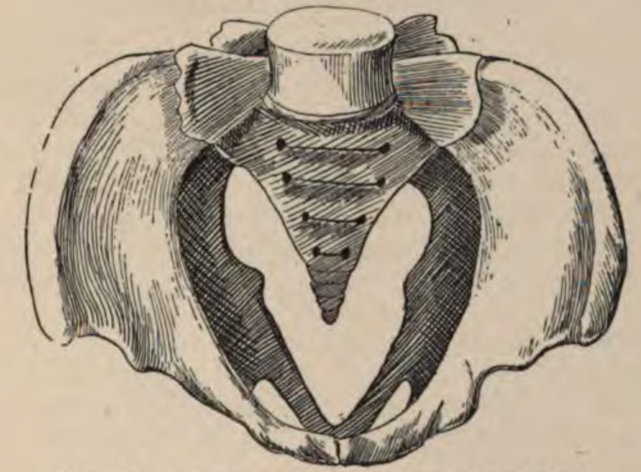

FIG. 333.—Rachitic cyphotic pelvis (funnel-shaped pelvis).

(f). *Alterations of the lower limbs.*—From the special point of view that we occupy, it is important to establish two distinct categories, according as there is, or is not, a coxo-femoral luxation (simple or double), for this luxation causes a special deviation of the pelvis. We shall then study successively the crural pelvis with luxation and the crural pelvis without luxation, it being understood that the term luxation will here be applied exclusively to the hip joint.

1. *Crural pelvis with luxation* (ilio- femoral pelvis of Guenot).—A. *Unilateral luxation.*—We shall note here cases in which the luxation

is backward, that is, toward the external iliac fossa or the great sacro-sciatic notch; luxation forward being relatively much more rare and its reaction on the pelvis still undetermined. The ilium of the luxated side is atrophied (Fig. 334). The symphysis pubis is thrown toward the diseased side by the atrophy of the ilium.

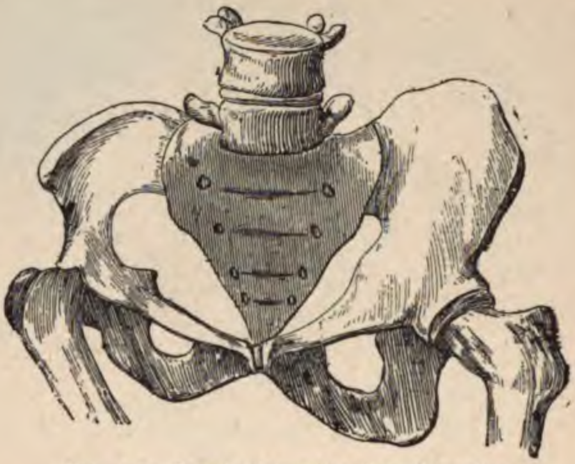

FIG. 334.—Crural pelvis with unilateral luxation.

The point of support for the head of the femur being displaced upward the ilium undergoes a swinging movement which draws the ischium away from the center of the pelvis. The result of this is to increase the dimensions of the transverse diameter of the median and of the inferior strait, while those of the same diameter of the superior strait remain normal or only slightly diminished. Unilateral luxation, especially, produces, then, a pelvic asymmetry, for the contraction which may result at the superior strait is but little marked.

B. *Bilateral luxation* (Fig. 335).—The alterations, which have been described for one side of the pelvis, exist here on both sides alike. The two iliac bones have been subjected to a certain degree of atrophy and to a swinging movement which separates the two ischii. The result is a notable enlargement of the inferior and of the median strait, transversely and obliquely, and a corresponding contraction of the superior strait. The displacement of the two femoral heads backward also causes a pelvic anteversion.

2. *Crural pelvis without luxation* (Fig. 336).—The alterations of the lower limbs, which, besides coxo-femoral luxations, may cause pelvic deviations are numerous. I shall only cite some examples: Traumatic affections—fracture, resection, amputation. Spontaneous affections—atrophy of a limb (congenital or acquired), various lesions of the articulations. These various alterations of the lower

limbs only act on the pelvis when they occur before the fifteenth year.

The pelvic deviations which result from different alterations are too varied and too little known to allow a systematic description. The two important ideas that it is necessary to retain are, that (1) the pelvis becomes asymmetrical; (2) one side is subject to flattening or to an atrophy of variable degree.

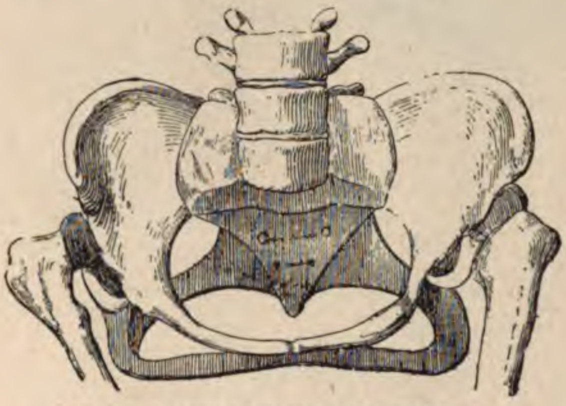

FIG. 335.—Crural pelvis with bilateral laceration.

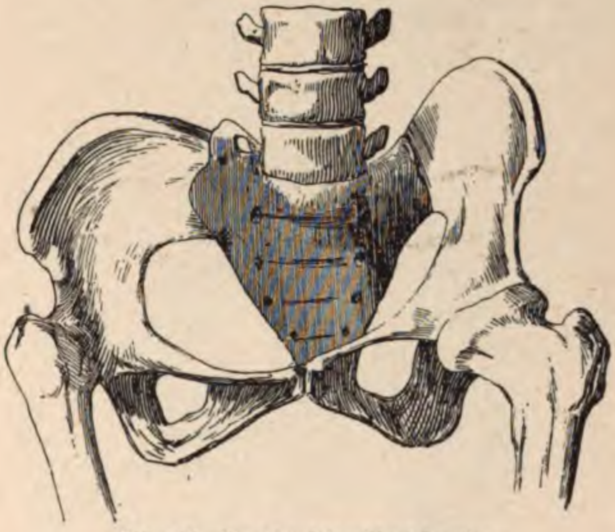

FIG. 336.—Crural pelvis without luxation.

(g). *Spondylizeme and spondylolisthesis* (*vertebral pelvis*).—Spondylizeme and spondylolisthesis are connected by a common point, the invasion of the pelvis by the lower or lumbar portion of the vertebral column, but the cause and the nature of these two affections are different.

Spondylizeme is characterized by bending forward of the spine. One or more of the diseased vertebræ become carious, weakened and demolished, and the contiguous part of the vertebral column, being no longer supported, falls toward the pelvis (Fig. 337). Spondylolisthesis is produced simply by a gliding of the last lumbar vertebra on the sacrum (Fig. 338).

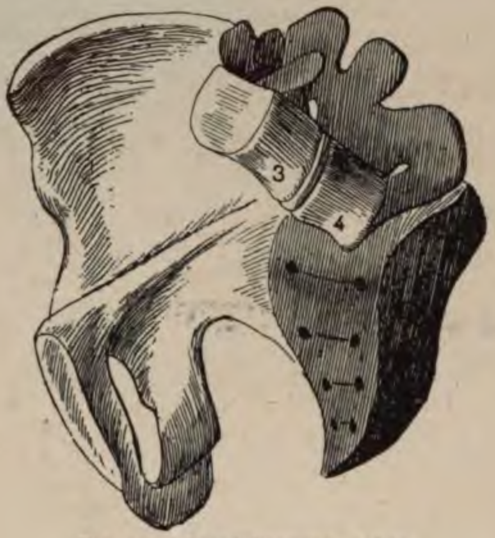

Fig. 337.—Spondylizematous pelvis.

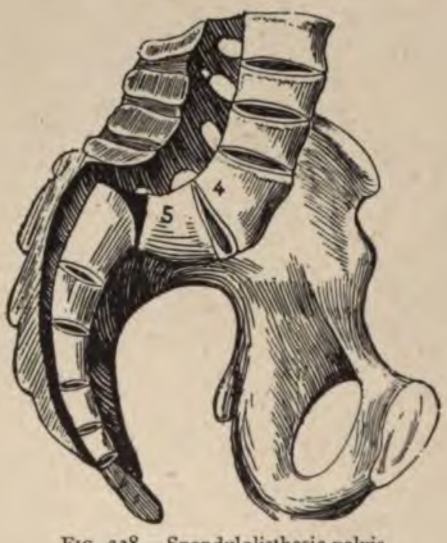

Fig. 338.—Spondylolisthesic pelvis.

(h). *Fractures* (*fractured pelvis*)—A crushing of the pelvis having produced multiple fractures of the iliac bones and of the sacrum, these become the cause of very capricious deformities. The different varieties cannot be made to conform to any systematic description. The pelvis is more or less invaded by a vicious reunion of the fragments (Fig. 339).

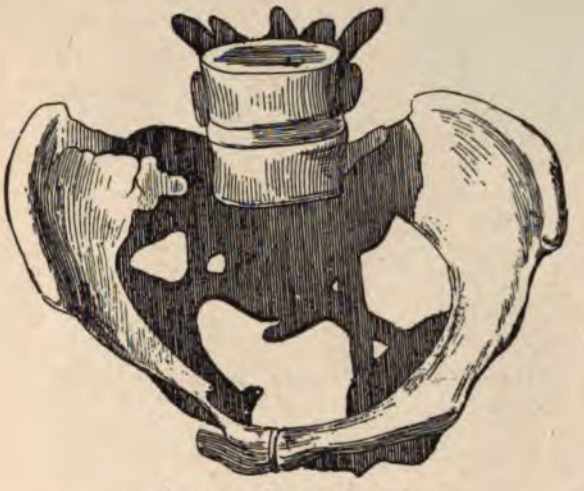

FIG. 339.—Fractured pelvis.

(i). *Tumors* (*neoplastic pelvis*)—The two varieties of tumors which may obstruct the pelvis are the exostoses (Fig. 340) and the osteosarcomata (341).

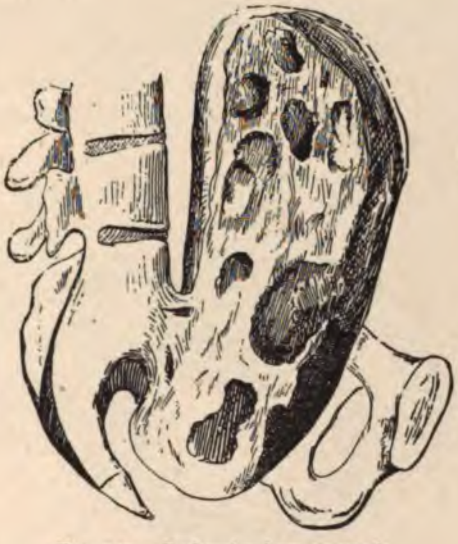

FIG. 340.—Deformity from exostosis.

B. *Complex pelvic deformities.*—It is impossible to describe here all the varied types created by the different combinations of deviation.

Knowing the simple forms of deformity it is easy to recognize the composite varieties. There are, however, some which demand a few lines of explanation. These are:

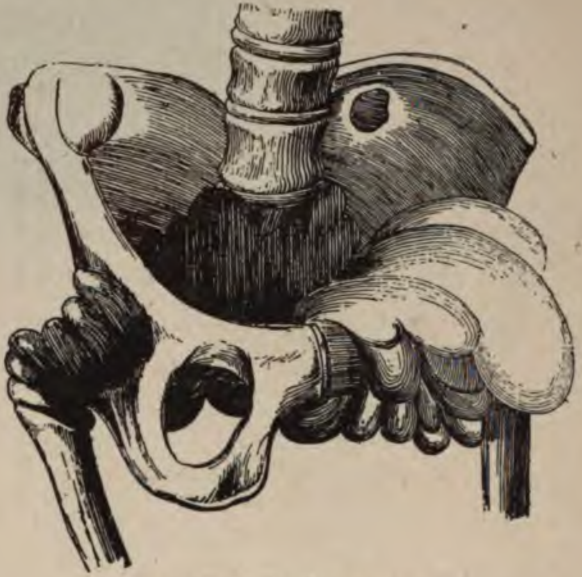

FIG. 341.—Deformity from osteo-sarcoma.

1. *The scolio-rachitic pelvis.*—The rachitis simultaneously attacks the vertebral column, which it deviates, and the pelvis, which it deforms. On the other hand, the pelvis may be subject to the action of both rachitis and scoliosis. The deviation is analogous to that met in the simple scoliotic pelvis but with the difference that the promontory is much more projecting and the flattening of the side attacked is more marked.

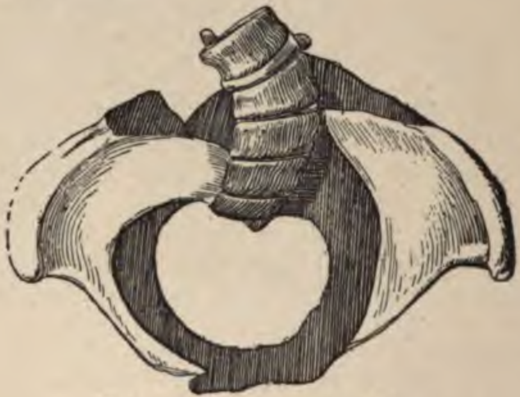

FIG. 342.—Cypho-scoliotic pelvis.

2. *The cypho-rachitic pelvis.*—Rachitis generally causes the projection of the promontory forward; cyphosis, on the contrary, throws

this same region backward in such a way that these two influences seem to reciprocally correct the deviation. But if the cyphosis and the rachitis are very pronounced there is, at the same time with the narrowing of the inferior pelvic region, a projection of the promontory, so that the pelvis is contracted antero-posteriorly at the superior strait, and especially, transversely at the median strait.

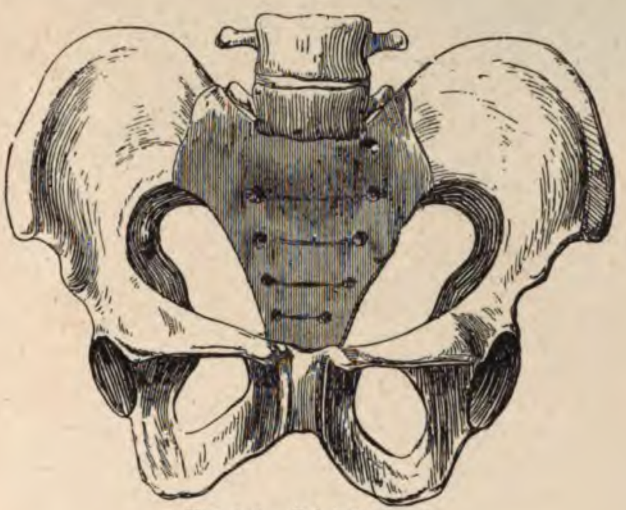

FIG. 343.—Pelvis too long.

3, *The cypho-scoliotic pelvis*—Cyphosis and scoliosis combining their action create a funnel-shaped pelvis, which is also asymmetrical. (Fig. 342).

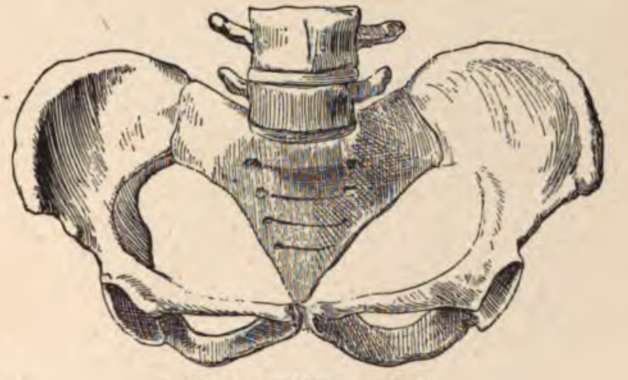

FIG. 344.—Pelvis too short.

II. *Deviations of length.*—The dimensions of the height of the pelvis are sometimes exaggerated (pelvis too long) (Fig. 343) and sometimes less than normal (pelvis too short) (Fig. 344). These deviations are of small practical importance. The second facilitates accouchement and obstetrical intervention; the first, on the contrary, renders these manœuvres difficult.

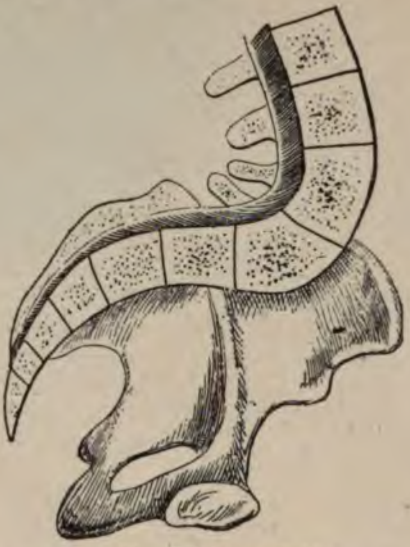

FIG. 345.—Pelvic anteversion.

III. *Deviations of direction.*—These deviations are, in the majority of cases, the result of deviations of the vertebral column.

1. *Anteversion*, the result of lumbar lordosis, is a lowering of the symphysis pubis, inclining the vulva backward and approaching the plane of the superior strait to the vertical (Fig. 345). With this inclination engagement of the fœtus in the excavation is difficult.

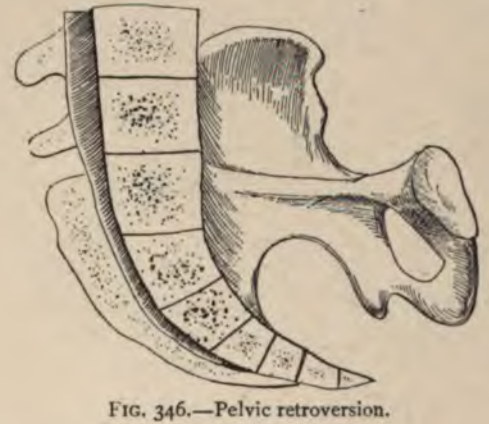

FIG. 346.—Pelvic retroversion.

2. *Retroversion* (Fig. 346), the result of cyphosis, produces an effect contrary to that of anteversion. The vulva is directed forward and its upper part can be seen when the woman is erect

and the thighs together, while in the normal state it is completely hidden in this attitude.

3. *Lateroversion* (Fig. 347), or lateral inclination, is the usual consequence of scoliosis and of inequality of the length of the lower limbs. It influences the inclination of the uterus during pregnancy.

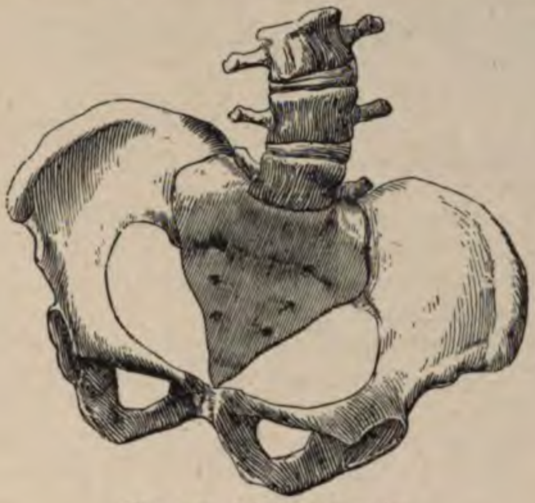

FIG. 347.—Pelvic lateroversion.

IV. *Deviations of continuity.*—Only one type of this deformity is known; that is, the cleft pelvis of Litzmann (Fig. 348).

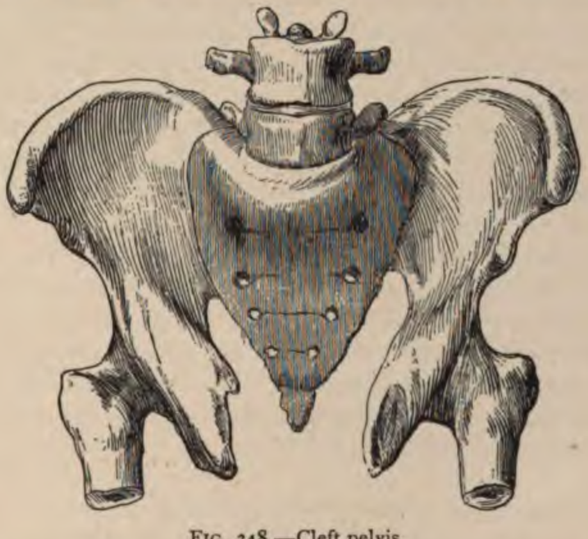

FIG. 348.—Cleft pelvis.

B. Symptomatology.—We shall study here the influence of the pelvic deformities on pregnancy and on accouchement.

1. *Pregnancy.*—Among the numerous accusations brought against the pelvic deformities, only two are justified. The contraction of the superior strait impedes the engagement of the fœtal part during the latter part of pregnancy. From this arises the practical advice to always think of the possibility of a pelvic deformity when, in the vicinity of accouchement, especially in a primipara, the fœtal head is still free at the superior strait. This default of engagement prevents the fixation of the fœtus and thus facilitates the production of vicious presentations.

2. *Accouchement.*—The default of engagement and the late engagement of the fœtal part, favoring the premature rupture of the bag of waters, or the formation of a voluminous sac, interrupts the opening of the cervix. There is fear of transformation of the vertex into brow or face, of procidence of the cord, or of uterine rupture. In presentation of the vertex the head presents certain peculiarities of descent interesting to know.

With a flattened pelvis, that is narrowed between the promontory and the pubes, the head, arrested at the superior strait, is placed transversely, then it inclines on its posterior parietal bone, rarely on its anterior; the posterior parietal protuberance passes around the promontory by a twisting movement, which usually brings the parietal protuberance to the side opposed to where it is found primarily. Then the head passes the contracted superior strait by a twisting movement of the posterior parietal protuberance and by swinging the biparietal diameter.

If there is a cyphotic pelvis, engagement, occurs with greater facility, disengagement, on the contrary, is difficult on account of the contraction of the median and of the inferior strait. The head, in particular, is often arrested at the level of the sciatic spines, where the projection is exaggerated by the pelvic deformity.

It is impossible to study the descent of the head in all the varieties of pelvic deviations. Besides the details of these different mechanisms are not well known.

When the head comes last, it may meet in the pelvic stenosis the same obstacle to its passage as when it presents first.

In the viciated pelvis where the promontory forms a very marked projection (rachitic variety) the head, arrested at the superior strait, sometimes presents in the region which is in contact with the sacrovertebral angle a more or less deep depression, that in exceptional cases becomes a fracture.

C. Diagnosis (*pelvimetry*).—To arrive at the knowledge of the different pelvic deformities which have been described it is necessary to measure the principal diameters of the pelvis, or, in other words, to practice pelvimetry. Pelvimetry may be instrumental or digital.

1. *Instrumental pelvimetry.*—There exist a great number of pelvimeters, some external, a variety of compass; others mixed, one branch remaining on the exterior while the other penetrates into the genital organs, and finally, the internal variety (Fig. 349), that is used in the vagina to measure the distance which separates the pubic symphysis from the promontory. All these instruments have fallen into a just oblivion, dethroned and replaced by digital pelvimetry.

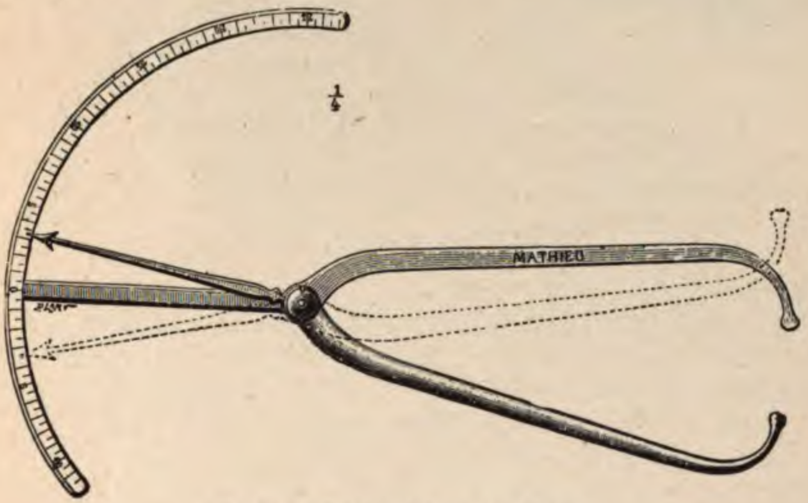

FIG. 349.—Pelvi-cephalometer of Budin.

2. *Digital pelvimetry* may be external or internal.

It is external when it relates to measurement of the bisischiatic diameter. The woman being placed on the side, or in the genu-pectoral position, the two thumbs depressing the soft tissues seek the internal surface of the ischium on each side in contact with which they are maintained while an assistant measures the distance separating the two exploring fingers. To this measure there is added the part occupied by the soft tissues, one to two centimetres.

In internal digital pelvimetry, by the introduction of the index finger (Fig. 350), of the index and middle finger (Fig. 351), or of four fingers (Fig. 352), one can measure the minimum promonto-pubic diameter and the sacro-pubic of the median strait. Only one finger should be used, as often as possible, and it is this uni-digital procedure that I shall describe in detail, for it should be familiar to every physician.

Minimum promonto-pubic diameter.—The index finger introduced into the vagina is directed toward the promontory. When, with a perinæum of median resistance, the finger cannot arrive at the promontory, the pelvis is normal (with regard to the promonto-pubic diameter, the one most often shortened); when, on the contrary, the finger can attain this point there is deformity.

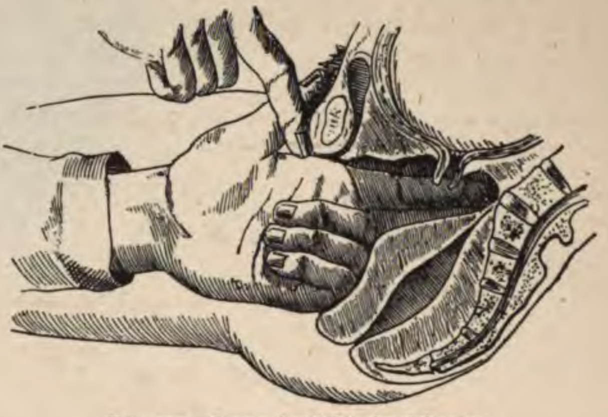

FIG. 350.—Internal unidigital pelvimetry.

Practical conclusion: Whenever a pregnant woman is examined in view of her accouchement, especially if a primipara, it should never be forgotten in digital examination to seek the promontory. If it cannot be reached, the chances are that the pelvis is normal, for out of ten cases of pelvic deformity it can be admitted that nine attack the promonto-pubic diameter.

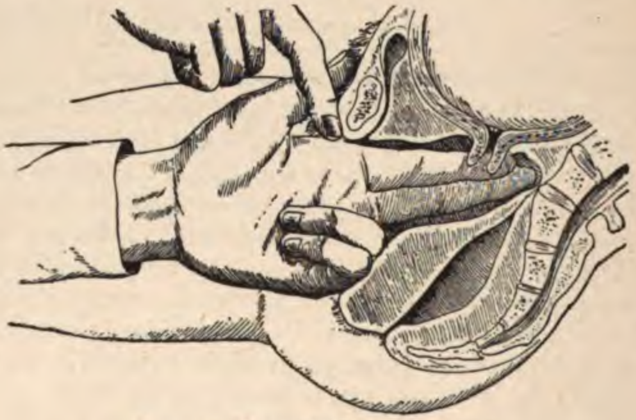

FIG. 351.—Internal bidigital pelvimetry.

When the promontory is attained, the radial border of the hand is applied against the inferior part of the symphysis pubis and with the index finger of the other hand the limit of the symphysis is marked, taking care to determine this point as exactly as possible. An assistant measures the distance which separates the extremity of the index finger from the point marked and the length of the promonto-subpubic diameter is thus known.

Now this diameter (in the normal state twelve centimeters) is generally one centimetre greater than the promonto-suprapubic and one and one-half centimetres greater than the minimum promonto-pubic. It is necessary then to subtract one and one-half centimeters from the length found to obtain the minimum promonto-pubic diameter.

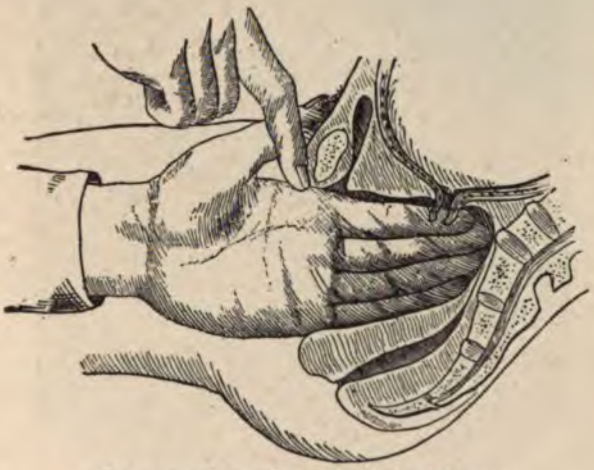

FIG. 352.—Internal quadridigital pelvimetry.

When the promontory is relatively high, or when it is desired to measure a false lumbar promontory, two centimetres are subtracted. In the contrary case, and with a false sacral promontory, only one centimetre, for the difference between the promonto-subpubic and the minimum pubic diameters is exaggerated as much more as the promontory is elevated and diminishes as it is lowered (Figs. 353 and 354).

Subsacro-subpubic diameter.—We proceed as above, seeking, by means of movements given to the coccyx, the sacro-coccygeal articulation. The distance obtained to the edge of the pubes is measured on the exploring finger; this is, without reduction, the subsacro-subpubic diameter.

Knowing these elements of pelvimetry we can study the diagnosis of the pelvic deformities. Here there will only be in question the simple contractions, as I shall eliminate all the other viciations, their importance being secondary.

It will be easy to suspect and to recognize the *atrophic pelvis* in a dwarf, the conformation of the woman will put us on the track of the diagnosis. But if the conformation be normal, the vagino-pelvic exploration alone will lead to the diagnosis. Digital pelvimetry will give the dimensions of the antero-posterior diameters and especially the minimum promonto-pubic. For the transverse dimensions, it is necessary to be content with an approximate valuation.

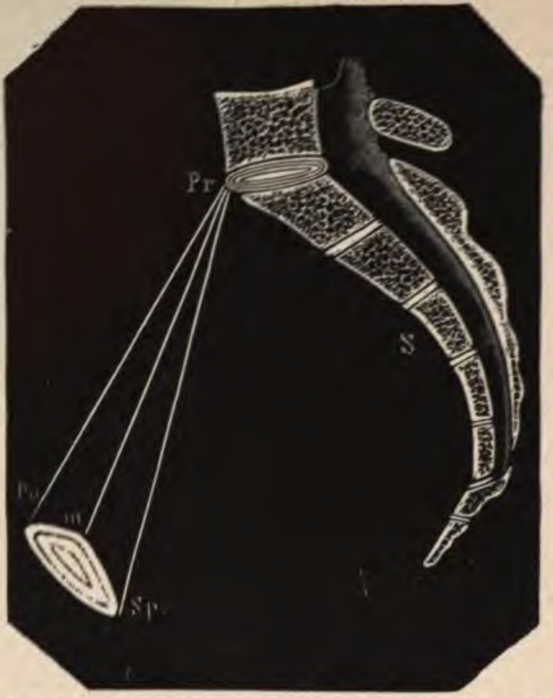

FIG. 353.—Promonto-pubic diameters (Budin). S, sacrum; Pr, promontory; Sp, promonto-subpubic diameter, twelve centimetres; Pu, promonto-suprapubic diameter, eleven centimetres; m, minimum promonto-pubic diameter, ten and a-half centimetres.

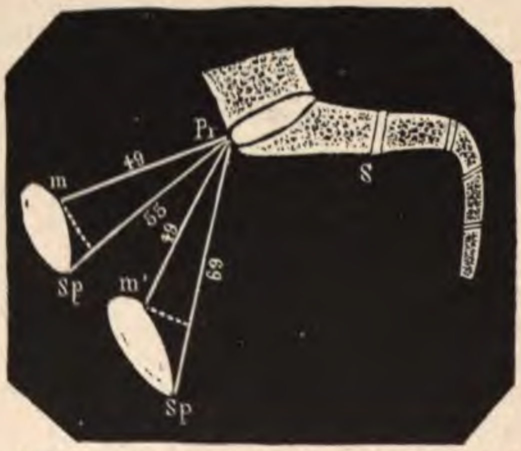

FIG. 354.—Variations of promonto-pubic diameters, according to the relative height of the symphysis pubis and of the promontory (Budin).

The rachitic pelvis will often be devined from the general aspect of the woman, small figure, large head, face sometimes asymmetrical, teeth bad, thorax prominent, deviation of the vertebral column, alteration in the curvature of the lower limbs, finally, walking will have been late, at two or three years of age instead of a year.

Direct examination will permit completion of the diagnosis, and will afford recognition of the variety and degree of the rachitic deviation. The three types of the atrophic pelvis will only be distinguished from the three corresponding varieties of the rachitic pelvis by the ætiology (rachitis exists in the second case while there is no trace of it in the first). In general the degree of viciation is relatively slight in the atrophic pelvis while it may be very pronounced in the rachitic.

The osteomalacic pelvis, besides the history which may throw some light on the causal disease, is recognized by its special form. The projection constituted by the symphysis pubis and the osseous defile which exists behind it are characteristic of the osteomalacic pelvis.

The sacro-iliac pelvis is recognized by the marked flattening of one or of both sides of the pelvis, with absence of cause with regard to the vertebral column and the lower limbs.

The rachitic, lordosic, scoliotic or cyphotic pelvis will be noted by the spinal deviation which thus serves as a guide. The diagnosis will be controlled and verified by direct exploration.

The crural pelvis will be sought in cases of alteration of the lower limbs. Its diagnosis is of secondary importance, for it is rare that the deviation is marked.

I only mention the diagnosis of the vertebral, fractured, and neoplastic pelvis, as these varieties can be considered as exceptions.

D. Prognosis.—The prognosis for the mother and for the child will vary essentially with the degree of the pelvic deformity.

A contraction of a few millimetres is without importance.

A more marked contraction, two, three, to four centimetres, for example, becomes much more serious, for it may necessitate more or less dangerous interventions (induced accouchement, forceps, version, embryotomy).

A very pronounced contraction renders the prognosis exceedingly grave, for there is often no other means of delivering the woman except Cæsarian section.

In the same woman the prognosis of the deformity becomes more serious as the number of pregnancies become greater. Thus it often happens that a pelvic deformity does not cause any difficulty in the first and second accouchement but becomes a serious obstacle in the third and fourth. This increasing gravity is probably due to the increasing volume of the fœtus at each new gestation.

E. Management.—In obstetrical language there are currently employed the expressions, pelvis of eight centimetres, pelvis of six centimetres, etc. By this we mean a pelvis the shortest diameter of which measures eight centimetres, six centimetres, etc. A normal pelvis is consequently a pelvis of ten centimetres. The degree of viciation is quite variable, but a pelvis of less than five centimetres is exceptional. The promonto-pubic diameter, being most often subject to deviation, is that which usually gives the figure to the pelvis.

The fœtus which must pass through the contracted pelvis should have, during accouchement, the head so placed that the antero-posterior cephalic diameters correspond to the largest space of the pelvis, the most narrow pelvic diameter being reserved for the transverse, the biparietal.

Now the biparietal measures at the end of the sixth month, six centimetres; seventh month, seven centimetres; eighth month, eight centimetres; ninth month, nine centimetres.

A pelvis of nine would permit accouchement, then, at term, a pelvis of eight at eight months; of seven at seven months; six at six months. Six complete months being the minimum term for the viability of the child, it will be seen that below a pelvis of six centimetres it will be impossible to deliver a woman of a viable child by the natural passages.

With these preliminaries let us study the conduct to be followed. We have five points to examine according as we are asked advice for a

a. Young girl to marry.
b. Married woman not pregnant.
c. Pregnant woman.
d. Woman in labor.
e. Special cases.

a. Young girl to marry.—If there exists a pelvic deformity local examination will recognize:

Pelvis below six centimetres, no marriage, for except by Cæsarian section it will be impossible for the woman to have a viable child.

Pelvis of six to nine centimetres, marriage is possible, but the necessity of inducing early accouchement will be foreseen.

Pelvis above nine centimetres, marriage is possible. Accouchement may take place at term but it should be explained that it may be difficult.

b. Married woman not pregnant.—Pelvis below six centimetres, no pregnancy.

Pelvis of six to nine centimetres, pregnancy possible, but necessity of inducing accouchement before term.

Pelvis above nine centimetres, pregnancy can go to term, but on account of the possible difficulties accouchement demands special care.

c. Pregnant woman.—Three circumstances may present:

1. Woman and child normally healthy:

Pelvis below six centimetres, to induce abortion, unless the woman demands Cæsarian section at term.

Pelvis from six to nine centimetres, to induce accouchement at a date indicated by the degree of contraction.

Pelvis of six centimetres at six months (beginning of the seventh month); pelvis of seven centimetres at seven months; pelvis of eight centimetres at eight months.

2. *Woman healthy and child dead.*—No intervention is necessary. Await the spontaneous appearance of labor.

3. *Woman unhealthy, child healthy.*—If the disease affecting the woman is without gravity the management remains the same as if she were healthy. But if the disease is grave, fatal (cancer, advanced tuberculosis); the child's life is to be regarded above all, the woman being condemned. In such cases the physician will be authorized to allow pregnancy to go to term and to perform Cæsarian section.

d. Woman in labor.—Three circumstances may be present:

1. Accouchement may be spontaneous;

2. Or, it will be necessary to resort to forceps or to version, interventions of the first degree;

3. Or, as a last resource, to perform embryotomy or hysterotomy, interventions of the second degree.

Parallel between forceps and version.—The parallel between these two operations, employed in the case of pelvic deformity, has given rise to long discussions. In intervening we especially have in view the passage of the fœtal head. Now, on the manikin, with the same degree of pelvic stenosis, the extraction of the head last (version) is incontestably more easy than first, with the forceps.

It is the same in a living woman with a dead child, on account of the mobility allowed the head by the hands and of the possibility of giving it different movements that the forceps do not permit.

But with a living child we meet a new element, the life of the child.

By the aid of the forceps (head first) traction can be made during a half-hour, and even more, and still a living child may be delivered. With version if the head, being last, is not extracted in less than five minutes the death of the child is assured.

Version having the greatest difficulty in the extraction of the head and forceps exposing less to the death of the fœtus, it is very difficult to decide categorically between these two modes of intervention.

Version seems preferable, however, in presentations other than those of the vertex (simple extraction in presentation of the breech).

The forceps, on the contrary, will be better in the majority of presentations of the vertex, unless the head is very high, or except when there is procidence of a limb or of the cord or any analogous condition rendering the application of the instrument difficult.

Parallel between hysterotomy and embryotomy. — I shall only present a resume of this subject.

A. *Mother healthy, child dead or condemned.*
  When manual extraction or by the forceps is impossible, recourse to embryotomy. Hysterotomy will only be indicated when embryotomy is not practical on account of the degree of pelvic contraction.

B. *Mother dying or condemned, child healthy.*
  Hysterotomy will here be preferable to embryotomy.

C. *Both mother and child healthy.*
  1. Pelvis about nine centimetres.
    Territory of manual extraction or of the forceps.
    Possible invasion of embryotomy.
  2. Pelvis seven to nine centimetres.
    Territory of embryotomy.
    Possible invasion of manual extraction or of the forceps, which should always be previously attempted.
  3. Pelvis of five to seven centimetres.
    Territory common to hysterotomy and to embryotomy. The choice should be in part left to the woman, leaving her free to expose herself or not to save her child.
  4. Pelvis below five centimetres.
    Territory of embryotomy.

e. Special cases.—Certain pelvic deformities, for example, osteomalacia may modify the line of conduct previously traced. In osteomalacia the pelvic bones may present, when the disease is recent, a certain suppleness which allows a relative facility of accouchement.

In a general manner, the narrowing of the median strait is less grave than that of the superior, for the fœtal head being less distant intervention becomes easier.

In the same way a multiple pregnancy, monstrosities, etc., create special conditions, into the detail of which it is impossible to enter.

CHAPTER XIX.

DISEASES OF THE GENITAL SYSTEM AND ITS DEPENDENCIES.—GENITAL DYSTOCIA.

1. *Narrowness and rigidity of the vulva* are especially observed in women first becoming pregnant late in life, or in consequence of morbid processes having caused local modifications of the external genital organs. Treatment: Prolonged bath during labor; forceps or manual extraction; recourse to vulvar incisions only when absosolutely necessary.

2. *Hymen.—Vaginismus.*—The persistence of the hymen after coitus, or rather the resistence of the ring surrounding it, sometimes obstructs the exit of the fœtus. The contractions of the constrictor muscle of the vulva or of the levator ani may also be a cause of dystocia. Treatment: Chloroform in a dose sufficient to cause muscular relaxation; forceps or manual extraction; incisions rarely necessary.

3. *Vices of vulvar conformation.—Cicatrices.*—The anomalies of the vulva and cicatrices in consequence of traumatism, gangrene, soft chancres, etc., may impede ampliation of this portion of the genital organs and obstruct expulsion. There sometimes exists an anomaly in the situation of the vulva, too far forward or backward; the first obstructs accouchement, the second facilitates it. In difficult cases the treatment is the same as for vulvar narrowness.

4. *Tumors.*—Vegetations, hypertrophic mucous plaques, cancer, œdema causing a tumefaction that is sometimes enormous, constitutes dystocic causes of variable importance. Treatment: Manual or forceps extraction, as slow as possible, to avoid great vulvar lacerations.

5. *Vices of conformation of the vagina.—Cicatrices.*—Besides duplicity there may exist in the vagina transverse bands, sometimes a veritable diaphragm of congenital origin, or cicatrices of variable resistance, consecutive to the traumatisms of previous accouchement. Treatment: simple expectation in slight cases. Prolonged hot injections, application in the vagina of a rubber dilator, vaginal massage, incisions, manual or forceps extraction.

6. *Vaginal prolapsus*, unless accompanied by a marked degree of uterine descent, is of small importance; however, it exposes to gangrene of the vaginal fold projecting through the vulva when the head remains too long at the perinæum. Treatment: sustain the vaginal fold with the fingers. Terminate the accouchement at need

by the forceps or by manual extraction, having the vagina sustained by an assistant in the meantime.

7. *Tumors.* — *Thrombus.* — Cysts of the vagina are rarely large enough to cause dystocia. The most important tumor of the vagina, for dystocia, is thrombus. This interstitial hæmorrhage results from the rupture of a normal vein, but most often is produced by the rupture of a varicose vein. It is exceptional before accouchement, rare during labor, and most frequent after delivery. Treatment: to abstain as much as possible; during pregnancy horizontal repose; during labor, to terminate the accouchement as soon as possible, and only to incise the tumor when it opposes an absolute obstacle to the passage of the fœtus.

8. *Resistance and œdema of the perinæum.*—Recognize the same causes as for these conditions of the vulva and require the same treatment. Perinæal lacerations have already been considered.

9. *Obliteration of the cervix.*—Agglutination of the lips of the external orifice is without importance and gives way, without difficulty, to the action of uterine contraction. Fibrous obliteration, affecting the internal or the external os in consequence of ulcerations or caustic treatment, prevents the opening of the cervix. This obliteration may be confused with a simple deviation of the cervix and it demands careful exploration, under anæsthesia, if necessary. If the obliteration of the cervix is real a cervical incision will be made in the supposed site of the external os, controlling its extent by the use of the speculum and vision. This opening is slowly enlarged, by multiple incisions, taking care not to wound the fœtus.

P. 2. Hart [illegible]

10. *Rigidity of the cervix* has been divided into pathological, spasmodic, and anatomical.

Pathological, that is to say, caused by the existence of a cervical affection, parenchymatous metritis, cicatrices, fibromata, cancer.

Spasmodic, due to muscular contraction of the cervix, and especially of the inferior segment of the uterus, for the latter is richer in muscular fibres than the cervix. The cervix and the inferior segment are painful, sensitive to pressure, hot, thin and tense if effacement is completed. The uterine contractions are irregular. Often there is fever. The dilatation of the cervix remains stationary or only advances very little, in spite of the acute sufferings of the woman. This spasmodic rigidity is due to too repeated explorations, to manœuvers intended to dilate the cervix, to any cause capable of irritating the cervix, but especially to the administration of ergot during labor. Treatment: chloral and chloroform, as for obstetrical anæsthesia. If the spasmodic rigidity does not yield to these measures it is on account of association with a pathological state.

Anatomical.—This rigidity is due to a special state of the cervix (and not of the inferior segment, as in the spasmodic) which impedes the opening and the dilatation of the uterine orifice. This rigidity may be relative, that is, the uterine contractions are not sufficient to vanquish the normal resistance of the cervix; this is a false rigidity that must be eliminated from this class, as it only includes real or absolute rigidity in which the uterine contractions are normal.

Contrary to the spasmodic variety, the effaced cervix is hard, thick, resisting, not painful and gives the sensation of leather soaked in grease. The uterine contractions are very painful, with lumbar predominance of the pain. The dilatation is effected with an extreme slowness and may last several days.

The cause of this rigidity is the incomplete softening of the cervix under the influence of pregnancy. Labor occurs before the puerperal state has sufficiently prepared the cervical portion for the distention to which it is subjected, thus premature accouchement is a frequent cause.

Treatment.—Procedures of the first degree.—Prolonged baths with vaginal injections in the bath. Irrigations of hot water. Borated glycerine or vaseline applied to the cervix in large quantities. Chloral applications to diminish the pain. Dilating rubber-bag introduced into the cervix.

Procedures of the second degree (*only exceptionally employed and in case of absolute necessity*).—Dilatation by a metallic instrument (Fig. 355). Multiple incisions (dangerous). Manual extraction or extraction with the forceps before complete dilatation, taking care to make very gentle and prolonged tractions during a half hour, three quarters of an hour, an hour or even more, during which the woman is kept under the influence of anæsthesia.

11. *Deviations of the cervix.*—The cervix or the external orifice after effacement may be deviated forward, backward or laterally, in the direction of the different vaginal culs-de-sac. The cause is either in the inclination of the body of the uterus, the cervix being carried in the inverse direction, or in the unequal development of the inferior segment of the organ. Deviation backward and to the left is normal. In the pathological state it is the exaggeration of this deviation that is most often observed. The treatment is nul during pregnancy. At the moment of labor the deviation is corrected by the position of the woman or by drawing on the external orifice with the hooked finger to replace it in the normal position.

12. *Tumors of the cervix uteri.*—Œdema occurring during accouchement is sometimes localized in a segment of the cervix and sometimes generalized. It requires no especial treatment. Simple hypertrophy is exceptionally a cause of dystocia. Vegetations,

abscess and thrombus are pathological varieties. The fibromata will be studied with those of the body. Cancer, on account of its importance, merits a description as to management.

Management.—Before conception, advise avoidance of pregnancy in an absolute manner.

During pregnancy.—Simple expectation with treatment of the pains and hæmorrhages by the usual measures, unless the mother is menaced by death, in which case we have recourse, if the child is living and viable, to induced labor, or to Cæsarian section before or after death. Amputation of the cancerous cervix and ablation of the whole uterus have been proposed and practiced but these operations are not to be advised any more than curetting and the actual cautery (?) as palliatives.

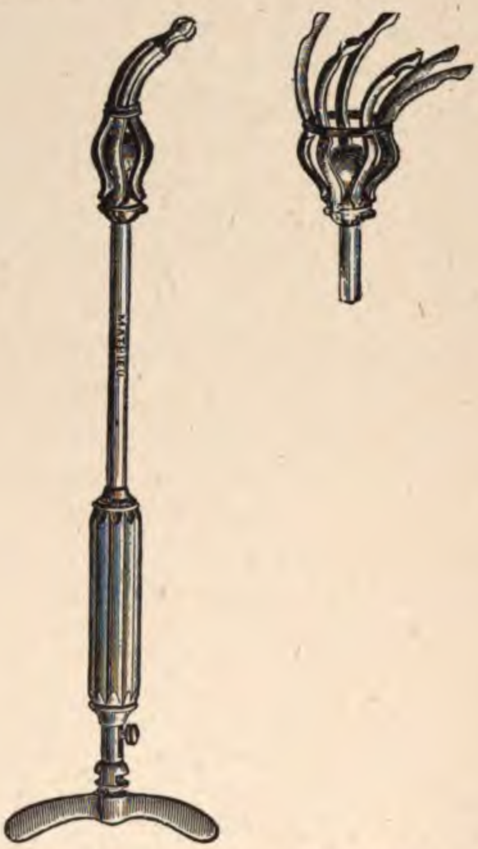

FIG. 355.—Metallic dilator with six blades.

During labor.—*Incomplete dilatation.*—*a.* While dilatation is progressing, whatever its slowness, expectation is the best conduct unless a pressing danger menaces the mother or the child. If the dilatation is stationary, if the mother or the child is in peril, it is necessary to terminate accouchement artificially. With a dead child, or when its chances of life are very small, embryotomy should be resorted to as much as possible. With a living child, manual extraction or the forceps will be attempted if the dilatation is sufficient. If the dilation is insufficient to attempt this intervention, Cæsarian section should be performed without hesitation. In some cases the extent of the cancerous invasion allows us to foresee the impossibility of dilatation of the cervix and the necessity for a Cæsarian operation.

(*b.*) *If dilatation is complete or almost complete*, extraction will be made as soon as possible by the usual methods. If a serious hæmorrhage follows after delivery utero-vaginal tamponnement is the preferable treatment.

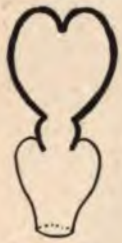
FIG. 356.
Heart-shaped uterus.

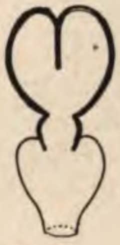
FIG. 357.
Divided uterus.

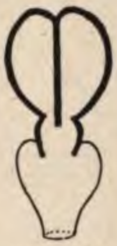
FIG. 358.
Double uterus.

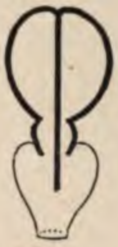
FIG. 359.
Double uterus and vagina divided.

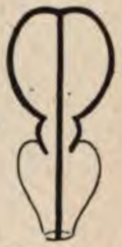
FIG. 360.
Double uterus and vagina.

13. *Vices of conformation of the uterus.*—These are constituted by incomplete fusion of Muller's canals. They are of various degrees (Figs. 356–360).

These anomalies of conformation may be the cause of vicious presentations. They expose to uterine rupture and render interventions difficult. Their management does not present any consideration of special importance.

14. *Anomalies of uterine contractions.*—There may be exaggeration, weakness, or perversion of uterine contractions.

Exaggeration in intensity, which exposes to rupture of the uterus, or to laceration of the perinæum, will be quieted by the use of chloral and of chloroform.

Weakening of the contractions, leading to uterine inertia during labor or delivery, is a state frequently observed, but which is usually intermittent and passing. It is most often produced by exaggerated distention of the uterus, by the death of the fœtus, by the length of labor or by certain acute moral impressions in nervous women.

Uterine inertia, while grave after delivery, has usually no other inconvenience during labor than that of prolonging accouchement. During labor, to wait will generally be the better plan. If not, there are several measures which often succeed. They are: To modify the position of the woman, to make her rise and walk when she is lying down. To apply a rubber bag in the vagina. Hot vaginal injection carried up to the cervix. Sulphate of quinine 0.50 to one gramme. Interrupted current of electricity to the uterus. To practice rupture of the membranes when the dilatation has passed three finger's breadths, when the presentation is normal and the head deeply engaged. Never forget ergot at this moment.

Perversions of the contractions is manifested in their irregularity or by their permanence in uterine tetanus. Chloroform or chloral usually re-establishes their normal intermittence.

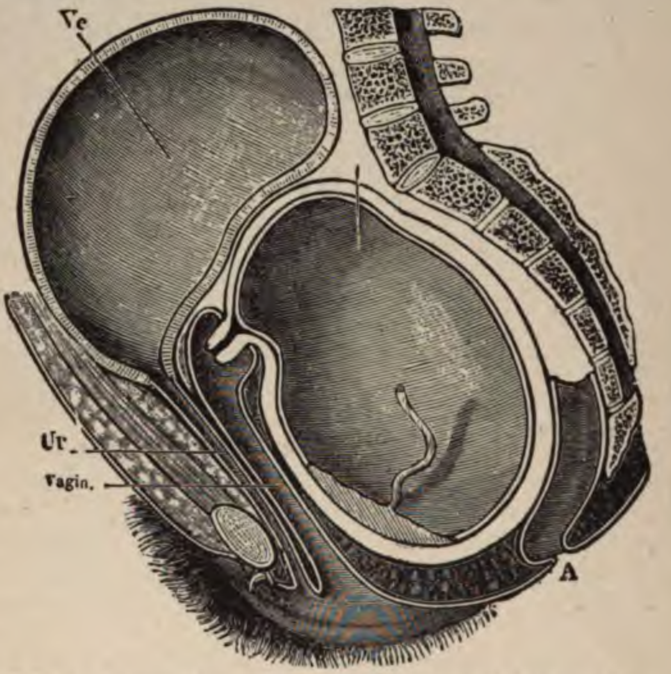

FIG. 361.—Retrodeviation of the gravid uterus (Schatz). Ve, bladder; Ur, urethra; A, anus.

15. *Uterine deviations.*—At the end of pregnancy, the body of the uterus is often deviated forward, when previous gestations have weakened the abdominal wall and produced a more or less pronounced eventration. An appropriate belt and, during accouchement, the horizontal decubitus is sufficient to correct this deviation. Lateral deviations are rarely causes of dystocia. They will be remedied by the position of the woman. The most important displacement, on account of the disturbances it is capable of causing, is retrodeviation (Fig. 361). The beginning of a retrodeviation is sometimes slow and insidious, sometimes sudden in consequence

of an effort or a fall. The most important symptom marking retrodeviation is the retention of urine, which may be complete or incomplete. The rectal compression by the body of the uterus causes an obstinate constipation. The pressure of the uterus on the perinæum produces a sensation of weight that is sometimes very painful.

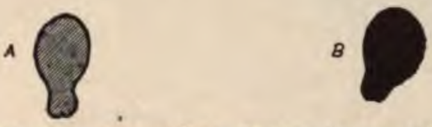

FIG. 362.—A, uterus free; B, uterus incarcerated.

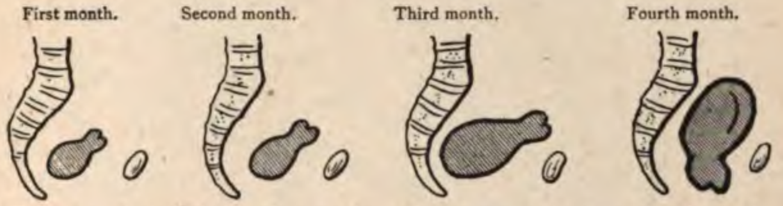

FIG. 363.—Retrodeviation of conception. Spontaneous reduction at fourth month.

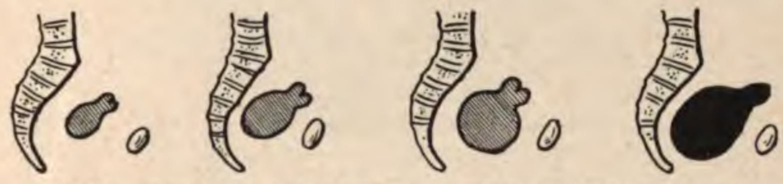

FIG. 364.—Retrodeviation of conception. Incarceration at the fourth month.

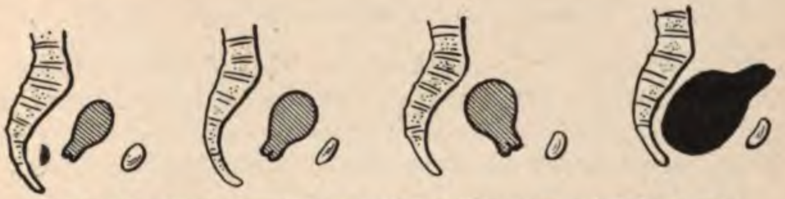

FIG. 365.—Uterus normal at conception, inclining progressively backward and incarcerated the fourth month.

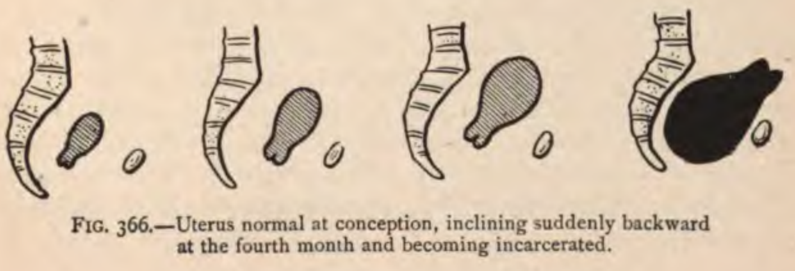

FIG. 366.—Uterus normal at conception, inclining suddenly backward at the fourth month and becoming incarcerated.

It is important in the evolution of retrodeviation to distinguish two periods or states: First, the period during which the uterus, not yet large, may be replaced in its normal position with relative facility; second, the period of incarceration or impaction, during which the uterus, now too large, cannot swing in the pelvic excavation and is found imprisoned. The period of incarceration is produced at the beginning of the fourth month of pregnancy (Figs. 362–366).

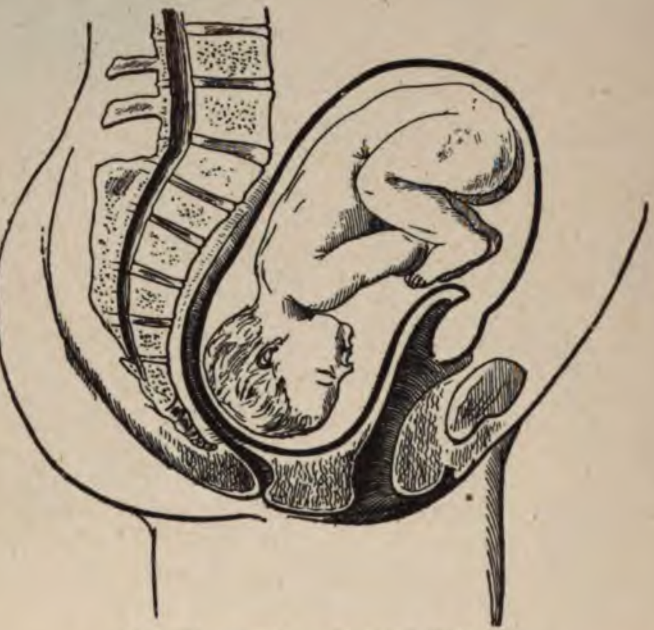

FIG. 367.—Sacciform dilatation (Oldham).

If the reduction of the retrodeviation takes place before incarceration the disturbances produced by the displacement are few. But at the moment when incarceration is produced important conditions arise which may terminate in various ways:

a. Termination with regard to the deviation.—There may be termination in spontaneous or induced abortion. When abortion does not occur there may be:

1. *Reduction* in consequence of repeated catheterism or of a special intervention intended to return the uterus to place.

2. *Semi-reduction* (*sacciform dilatation*) (Fig. 367).—This is produced by progressive development of the wall of the uterus toward the abdomen (Fig. 368). This variety should be distinguished in a pathogenetic point of view from that produced at the end of pregnancy by ampliation of the posterior inferior segment of the uterus (Fig. 369).

3. *No reduction.*—The child dies and abortion is produced after a variable time.

b. Termination with regard to the patient.—Cure after reduction or abortion. Death may be produced before or after reduction, by septicæmia, by gangrenous cystitis, by rupture of the posterior wall of the vagina, of the rectum, and of the perinæum, or by a renal complication.

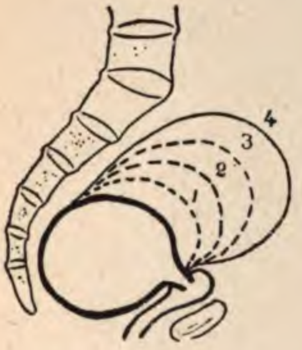

FIG. 368.—Sacciform dilatation following retrodeviation.

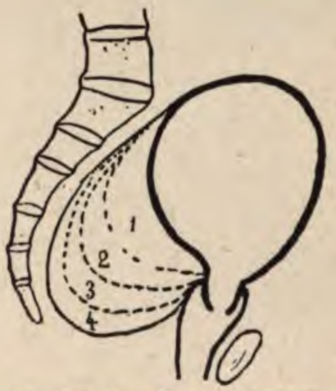

FIG. 369.—Sacciform dilatation without previous retrodeviation.

Treatment.—When incarceration does not exist attempt should be made to replace the uterus by slight pressure with the finger in the posterior cul-de-sac. For the same purpose the patient is ordered to assume the genu-pectoral position for twenty minutes every morning and night. When incarceration exists there are three methods to follow, expectation, manual or instrumental reduction, induced abortion.

1. *Expectation.*—Simple expectation, aided by regular catheterism, three times a day, is sufficient in the majority of cases to cause spontaneous reduction, in eight to fifteen days. Thus, except in serious accidents, this is the method to follow. But the necessity of rectal evacuations should not be forgotten.

2. *Reduction.*—Manual or digital reduction will be attempted with the woman in the dorsal, lateral, or genu-pectoral position. In difficult cases chloroform should be employed. A prolonged bath will be favorable as a preparation for attempts at reduction. Sometimes the introduction of a rubber bag into the rectum, leaving it inflated for twenty-four hours, causes gradual reduction.

3. *Induced abortion.*—In cases where reduction is impossible and where grave symptoms necessitate prompt intervention, abortion should be induced at once.

16. *Uterine prolapsus.*—Complete or incomplete prolapsus may exist at any period of term (Fig. 370). Treatment: Reduction of the uterus with its contents; if this is impossible, previous evacuation (induced abortion) with final reduction.

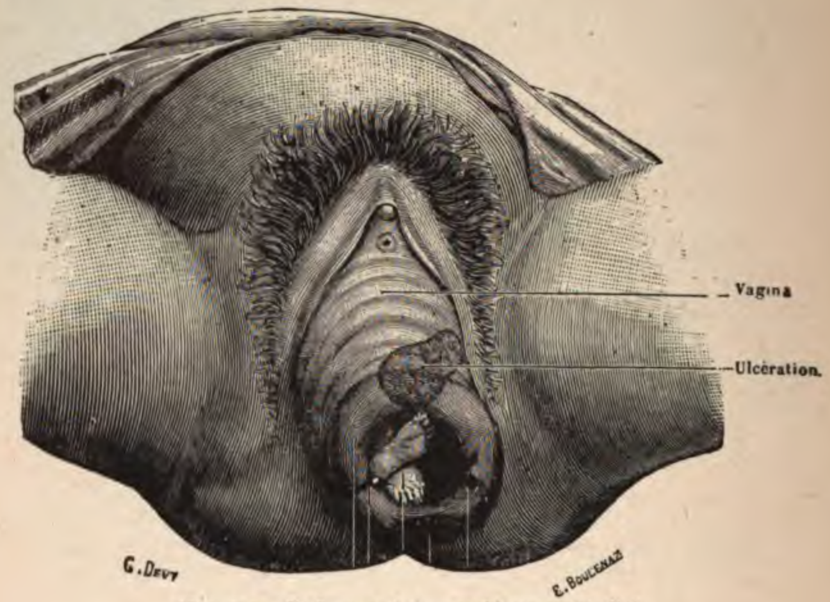

FIG. 370.—Prolapsus of the gravid uterus (Budin).

17. *Uterine ruptures.*—Uterine ruptures may be divided:

In view of the situation, into:

1. Intra-vaginal (lacerations).
2. Supra-vaginal, affecting the cervix, the isthmus or the body (this variety only will be taken under consideration here).

In view of the degree, into:

1. *Incomplete.*—Peritonæum intact.

a. Intra-muscular.—Simple separation, not attacking the whole thickness of the muscular wall.

b. Supra-muscular.—All the muscular wall is attacked, but the peritonæum, the bladder and the broad ligaments are not involved.

2. *Complete.*—Peritonæum involved. The uterine cavity is in direct communication with the peritonæal cavity.

3. *Complicated.*—Wound of a contiguous organ. Opening of the bladder or intestine.

In view of the date of the puerperal state, into:

1. Ruptures of pregnancy.
2. Ruptures of labor.
3. Ruptures of post-partum.

Ruptures of pregnancy and those of post-partum are relatively rare and result in most cases from traumatism. Their study presents only a secondary interest and we shall confine this description to the rupture of labor. Frequency, 1 per 1000 accouchements.

Ætiology and pathogeny.—Ruptures at the moment of labor may be:

1. *Traumatic.*—Abdominal traumatism, blow on the abdominal wall, penetrating wound. Intra-uterine traumatism, version, forceps, embryotomy, etc.

2. *Spontaneous.*—Accouchement, with regard to the uterus alone, is the struggle between the uterine muscle and the obstacles which oppose the exit of the fœtus, a veritable duel in which the victory generally remains with the uterus; if not, the exhausted muscle, thinned by the struggle, is ruptured and the accident we study occurs.

It is important to know:

The causes of this exaggerated struggle.

The circumstances which favor the rupture.

Causes of the exaggerated struggle.—Periuterine, pelvic deformity, tumor of the contiguous tissues. Uterine, obliquity of the uterus, rigidity of the cervix. Intra-uterine, exaggerated size of the fœtus, hydrocephalus, monstrosity, vicious presentation.

Circumstances which favor rupture.—

1. *Uterine causes.*

Pathological uterus.—Thinning of a part of the wall, partial degeneration, malformation, cicatrix.

Uterus rendered pathological.—By ergot, by intra-uterine irritation (introduction of the hand or of an instrument).

Normal uterus.—The progressive thinning of the inferior segment may be such (Fig. 371) that at a given moment it causes rupture.

2. *Periuterine causes.*—Projection of the promontory. Abnormal projections of the pelvis (exostoses). Vulvo-vaginal atresia.

3. *Intra-uterine causes.*—Projection of a hand or foot. Osseous splinters in consequence of embryotomy.

Symptoms.—The woman suddenly feels a sharp pain in the abdomen and sometimes a sensation of internal tearing. Following rupture there is a sensation of relative relief. The pains, however, quickly return, either as uterine contractions or under the form of peritonitis resulting from the rupture.

In direct examination of the woman different cases may present:

1. *The fœtus remains in the uterus.*—Direct examination furnishes scanty information. At the level of the rupture an unequal region is felt, very painful to pressure.

2. *The fœtus has passed completely or incompletely into the peritonæal cavity.*—By palpation one finds above the tumor formed by

the uterus, the fœtus making a more or less notable projection. Auscultation, silence. Digital examination, the uterine orifice does not present the fœtus.

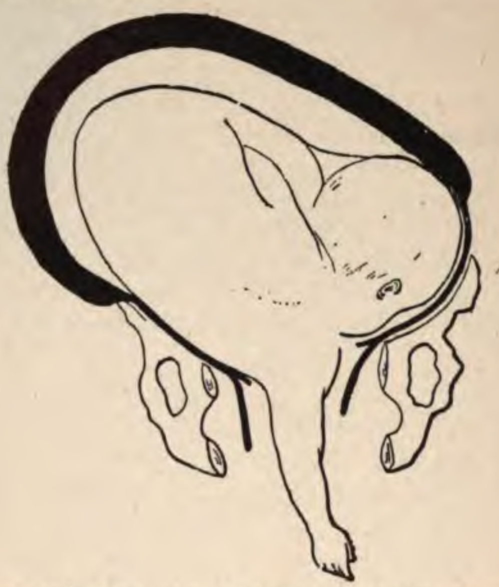

FIG. 371.—Thinning of the inferior segment of the uterus, previous to rupture (Bandl).

The fœtus has been expelled.—Accouchement is terminated except the delivery of the appendages. Intra-uterine touch alone can give in such cases valuable information. Rupture renders expulsion of the appendages impossible and as artificial delivery thus becomes necessary it is by introducing the hand into the uterus that the accident is perceived.

The *treatment* is preventive and curative.

Preventive, in all cases of serious dystocia, when the uterine contractions are energetic, by diminishing the pains by the use of chloroform and by aiding the uterus as much as possible.

Curative.

a. Before accouchement.—1. *The fœtus is in the uterus.*—Terminate accouchement by version, extraction, or forceps, provided the opening of the uterine orifice is sufficient, if not, act as in the following case.

2. *The fœtus is partly or completely in the peritonæal cavity.*—Laparotomy is the wisest course in all cases. In cases of too extensive laceration of the uterus Porro's operation may be performed.

18. *Uterine tumors.*—Cancer has been studied in relation to the cervix. We have only to deal with the fibromata here. They are classified as follows:

1. *Interstitial* (Fig. 372):
    1. Of the body.
    2. Of the cervix.

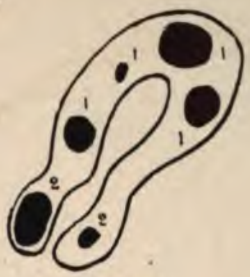

FIG. 372.

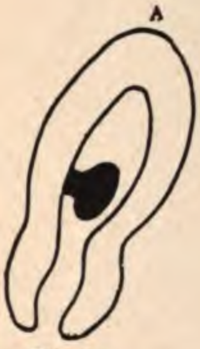

FIG. 373.

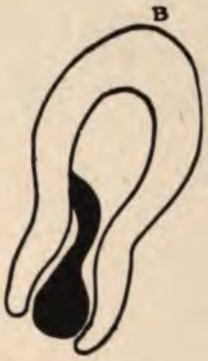

FIG. 374.

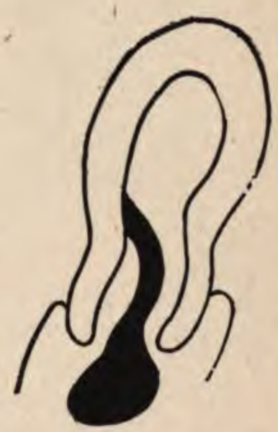

FIG. 375.

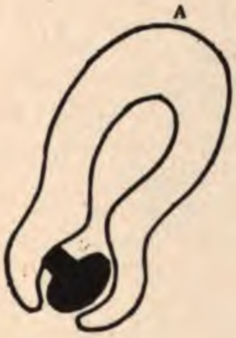

FIG. 376.

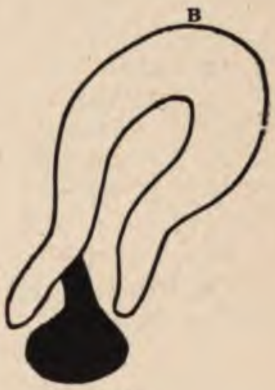

FIG. 377.

2. *Of the internal surface of the uterus (submucous).*
    1. Of the somatic cavity:
        - A. Somatic habitat (Fig. 373).
        - B. Cervical habitat (Fig. 374).
        - C. Vaginal habitat (Fig. 375).

2. Of the cervical cavity:
    - A. Cervical habitat (Fig. 376).
    - B. Vaginal habitat (Fig. 377).

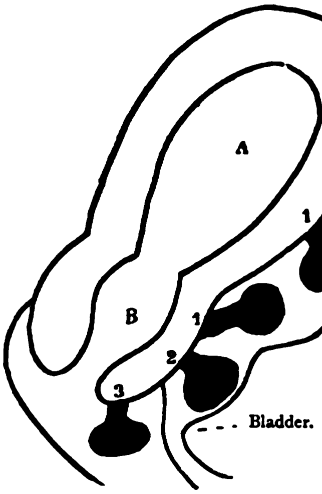

Fig. 378.

3. *Of the external surface of the uterus.*
    1. Anterior wall (Fig. 378):
        - A. Body.
            - 1. Subperitonæal fibromata:
        - B. Cervix.
            - 1. Subperitonæal.
            - 2. Subvesical.
            - 3. Intra-vaginal,
    2. Lateral wall (Fig. 379):
        - A. Body.
            - 1. Subperitonæal.
            - 2. Intra-ligamentous.
        - B. Cervix.
            - 1. Intra-ligamentous.
            - 2. Intra-vaginal.
    3. Posterior wall (Fig. 380):
        - A. Body.
            - 1. Subperitonæal.
        - B. Cervix.
            - 1. Subperitonæal.
            - 2. Intra-vaginal.

In view of dystosia, however, we may again divide the fibromata into:

La~~c~~tero-superior fibromata.
Fibromata prævia.

The latero-superior cavity has a certain degree of interest in obstetrics, for the tumor may interfere with pregnancy by its size or by its situation near the placenta. The importance of fibroma prævia is, however, in a practical point of view, much more considerable.

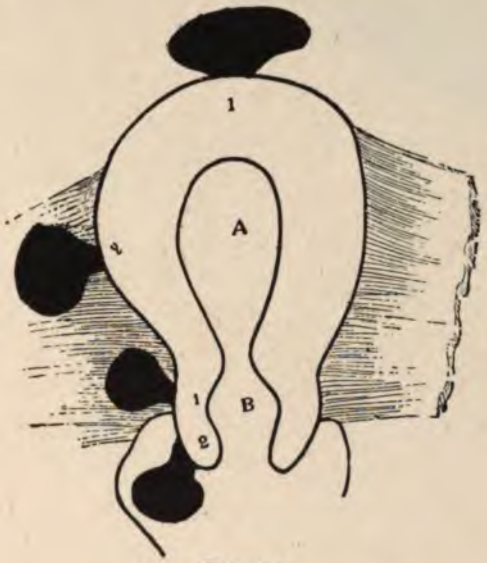

FIG. 379.

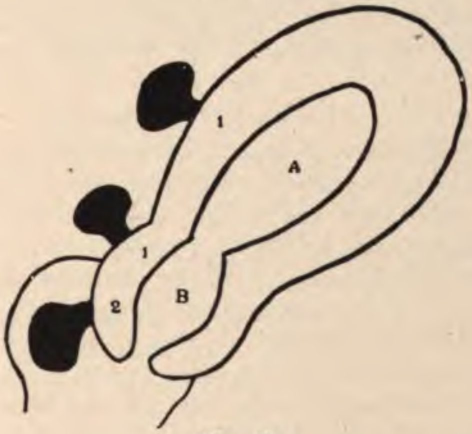

FIG. 380.

Every fibroma increases in size and is subject to a certain degree of softening under the influence of gestation, then it diminises after accouchement. Thus even a small tumor may become a serious obstacle to accouchement, by its growth.

Fibroma prævia (Fig. 381) predisposes to premature expulsion of the ovum, to vicious presentations, to premature rupture of the membranes, to procidence of the limbs or of the cord and to hæmorrhages, but the most grave consequence is the difficulty or the impossibility of accouchement.

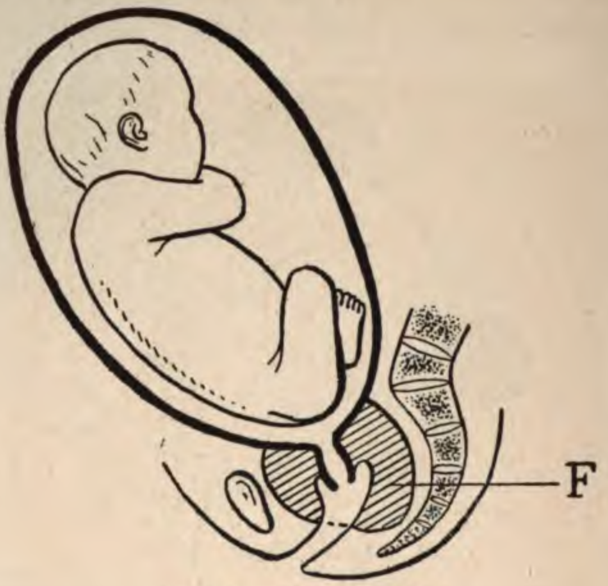

FIG. 381.—F, fibroma prævia.

The management of labor in these cases consists in:

1. Waiting, when the life of the child, and that of the mother especially, are not in danger. Accouchement sometimes is terminated spontaneously when a most serious prognosis would have been given.

2. If spontaneous accouchement is impossible, recourse to the forceps, to version, or to extraction. It is generally better to deliver the child head first (forceps) than last (manual extraction).

3. In grave cases where the forceps and manual extraction are insufficient there remain, as ultimate resources, the extirpation or the pushing up of the fibroma, embryotomy and Cæsarian operation.

Pushing up the fibroma should be attempted under chloroform, but this has chances of success only when the tumor is subperitonæal, occupying Douglas' cul-de-sac.

In cases of intra-vaginal fibromata, extirpation will be successful.

Embryotomy will be preferable if the child is dead, or if, with a passage sufficiently large for convenient use of the instruments, pushing up the tumor or its ablation is impossible.

Cæsarian operation is the last resource that we are obliged to employ.

19. *Hernias of the bladder, of the intestine, and of the omentum.*—Cystocele and rectocele do not demand any special treatment during labor, except that they should be kept reduced as much as possible.

In cases of inguinal, crural or umbilical hernia of the intestine, with or without omentum, reduction should be maintained by an appropriate bandage. The efforts of the patient should be abridged by the forceps or by extraction during the period of expulsion.

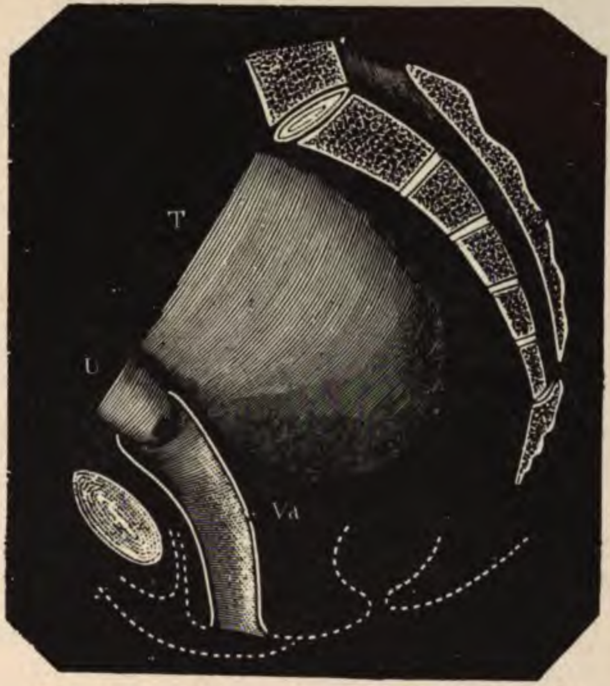

FIG. 382.—Cyst of the broad ligament. T, cyst; U, cervix; Va, vagina (Budin).

20. *Tumors of the ovary and its vicinity.*—Any abdominal tumor may interrupt the normal course of pregnancy and of accouchement. Among these, cysts of the ovary and of the broad ligament are especially to be mentioned on account of their relative importance. The cyst may fall into Douglas' cul-de-sac (Fig. 382) and obstruct accouchement. Puncture, then, permits us to remove the obstacle. During pregnancy, if the cyst is voliminous and there is fear of serious complications, it may be removed by ovariotomy.

CHAPTER XX.

DISEASES AND ANOMALIES OF THE PLACENTA.

1. *Placentitis.*—Inflammation of the placenta, if it exists, is not yet well understood.

2. *Atrophy and hypertrophy,* which may affect the whole of the placenta or each element in particular, are without consequence unless accompanied by another pathological state.

3. *Apoplexy and hæmorrhage.*—Placental hæmorrhages or apoplexies of maternal origin present under three forms: 1. Sanguineous infiltration, not well limited. 2. Focus with irregular walls. 3. Clearly circumscribed focus. The blood thus suffused undergoes the usual evolution. The causes are cardiopathy, albuminuria, infectious disease, traumatism, fluxion coincident with menstrual period. Often there is no appreciable cause. It results in arrest of the development of the child, in its possible death, or in abortion. The treatment is nul, except that directed to the supposed cause. In women, who, during pregnancy, have menstrually congestive symptoms relating to the uterus, a venesection of one hundred and fifty to two hundred grammes might be repeated at each menstrual period, if placental hæmorrhage has caused interruption of previous pregnancies.

4. *Œdema* exists, but it is not well understood. Its practical importance is nul.

5. *Fibro-fatty degeneration (sclerosis).*—Under the influence of endometritis, of syphilis, or most often from an unknown cause, the chorial villi are invaded by fibro-fatty degeneration; the process is analogous to that which physiologically destroys the villi outside the placental zone. The placenta is thus partially or completely invaded from the periphery toward the center. The result is the enfeeblement or the death of the fœtus, with consequent abortion. In an hystological and a pathogenetic point of view this degeneration differs from placental apoplexy where the hæmorrhage is the initial phenomenon, but the result is analogous. Often the two processes combine to cause placental destruction and death of the fœtus. Treatment: Remedy the endometritis and all pathological states of the genital organs.

6. *Calcareous degenerations.*—A variety of petrification at desseminated points, which often invades the placenta, especially at its

uterine surface. Cause, unknown. Influence on the development of the fœtus, nul.

7. *Albuminuric alterations.*—Whitish plaques, due to fibro-fatty degeneration.

8. *Syphilitic alterations.*—Hypertrophy of the villi. Fibrous degeneration. Caseous islets. Gummata.

9. *Cysts* are frequent at the fœtal surface. They have a volume from that of a nut to that of a mandarin. Some, of hæmatic origin, are comprised in the thickness of the chorion. Others, serous, formed by a substance analogous to Wharton's jelly, are situated between the chorion and the amnion.

10. *Solid tumors.*—Fibromata. Angiomatous fibromata. Fibrous myxomata. Sarcomata. Not well known. Very rare.

11. *Adhesions.*—When expulsion takes place before term, in consequence of hæmorrhage, of degeneration, and most often without appreciable cause, there exists an abnormal adhesion between the uterus and the placenta, in such a way that separation is difficult, almost impossible. The adhesion is sometimes so great that after opening the uterus post-mortem it is impossible to detach the placenta without the aid of a cutting instrument. The management will be noted apropos of the complications of delivery.

12. *Hydatiform mole* is the term used to designate a special degeneration of the placenta and its membranes. Its aspect recalls that of a hydatid cyst. The hydatiform mole is manifested by three principal symptoms: The abnormal development of the uterus, the uterine hæmorrhages, and the escape of vesicles. A detachment of vesicles with expulsion, however, is rare, unfortunately for the diagnosis.

The expelled mole presents sometimes under the form of a mass of vesicles from the size of a pinhead to that of a nut, not united in an envelope, sometimes, on the contrary, they are surrounded by the membranes of the ovum (Fig. 383).

It is now admitted that the hydatiform mole is the result of degeneration of the ovuline appendages and in particular the chorial villi. However, accord is not yet complete on the nature of this alteration. Robin believes it to be a hydropsy of each villus. Virchow attributes it to a myoma developing at the expense of the elements of villus, and causing cystic degeneration.

Treatment.—1. Before expulsion, simple expectation. If hæmorrhage becomes abundant, vaginal tamponnement becomes necessary, performed, we shall soon see, as for placenta prævia. Provocation of labor is never indicated.

2. During expulsion, cervix not open, same conduct as before. Cervix open, allow spontaneous expulsion, unless there is grave

hæmorrhage, in which case the hand will be introduced into the uterus to detach and to remove the whole mass.

3. After expulsion, rigorous antisepsis. If the flow is fetid and contains debris, antiseptic intra-uterine injections are necessary, and at need curetting, completed or not by intra-uterine tamponnement.

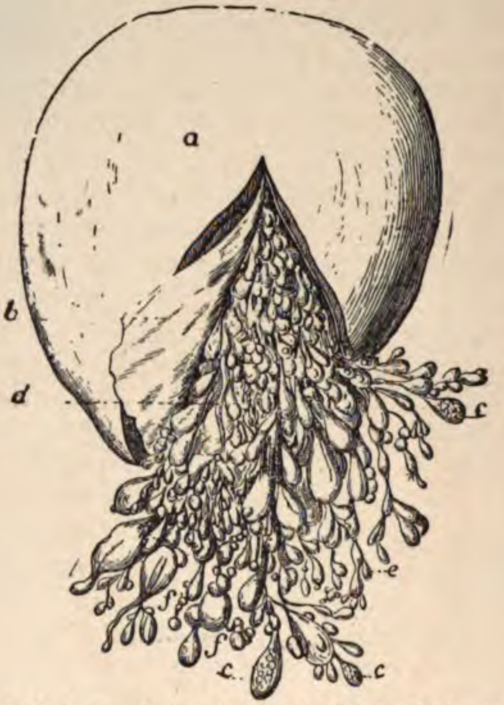

FIG. 383.—Hydatiform mole (Boivin). *a*, decidua; *b*, chorion and amnion; *d*, vesicls; *c c f*, vesicles of different size and form.

13. *Vicious insertion of the placenta.—Placenta prævia.*—Let us divide the uterus into three regions by two parallel planes, the inferior passing at eight centimetres from the internal orifice, the superior at eight centimetres from the superior pole of the uterus (Fig. 384). Every placenta, which, by any part of its surface, is inserted below the plane C D, is an inferior polar placenta or prævia. Likewise every placenta which, by any part of its extent, is inserted above the plane A B, is a superior polar placenta. Every placenta inserted between these two planes is equatorial or median.

In one-third of all cases the placenta is inferior polar or prævia. In two-thirds of all cases the placenta is of the superior polar variety (normal or physiological insertion). It is quite exceptional for the placenta to be whole equatorial (Fig. 385).

It will then be seen that placenta prævia is far from being rare, and that it becomes of importance by having its insertion on the uterine passage which the fœtus must follow in its exit from the genital organs.

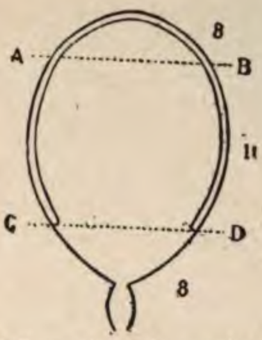

FIG. 384.—A B, constitutes the superior polar circle; C D, the inferior polar circle.

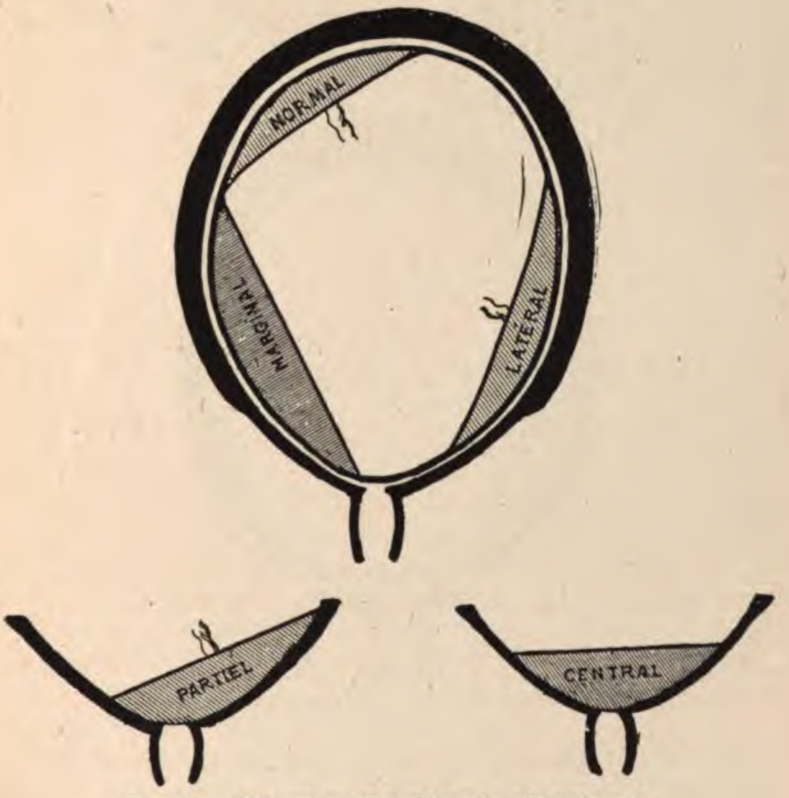

FIG. 385.—Different varieties of insertion of the placenta.

There are four varieties of placenta prævia:

1. *Central placenta prævia.*—The center of the placenta corresponds to the internal orifice of the uterus.

2. *Partial placenta prævia.*—Some point of the placenta, intermediate between its center and its border, corresponds to the internal orifice of the uterus.

3. *Marginal placenta prævia.*—The edge of the placenta lies over the internal orifice of the uterus.

4. *Lateral placenta prævia.*—The edge of the placenta is found at from one to eight centimetres from the internal orifice. All the inferior segment, which extends circularly to eight centimetres from the internal orifice, constitutes the zone of dangerous insertion.

The frequency progressively increases from the first to the last variety. Central placenta prævia is very rare. Lateral placenta prævia is the most common.

Exceptionally, the placenta may be inserted in part in the cervical cavity (cervical pregnancy). The accidents and the management are the same as in central placenta prævia.

I shall only mention cases in which there is a vicious insertion of an accessory cotyledon (Fig. 386). The management is the same as in ordinary placenta prævia.

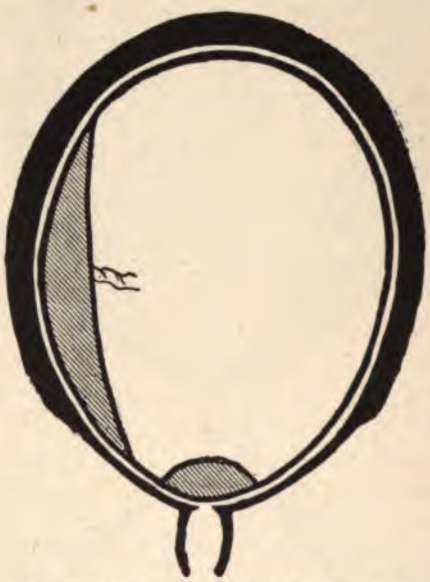

FIG. 386.—Accessory cotyledon prævia.

In examining a partial or central placenta prævia soon after its expulsion, three zones of different color are often found on its uterine surface: a central, corresponding to the internal os, pale and yellowish; an intermediate, reddish; a peripheral, clearer. These different zones are due to circulatory modifications of the placenta and to hæmorrhages during pregnancy.

The fœtus is usually less developed than in the normal state.

Symptoms.—a. Pregnancy.—Hæmorrhage, premature rupture of the membranes, vicious presentations of the fœtus, premature expulsion of the ovum, are four possible consequences of placenta prævia. Any one of these symptoms allows us to think of a vicious insertion of the placenta.

Every abundant hæmorrhage occurring during the last three months of pregnancy, when there has been no flow of blood during the first six months, is the result of a placenta prævia.

Direct examination furnishes certain confirmative signs. Among these there are two of importance, the thickening of the inferior segment of the uterus, perceived by digital examination, and the vagueness which accompanies the perception of ballottement and which results from the presence of the placenta. The other signs that it is pretended can be gathered by palpation (placental doughyness), by auscultation (placental souffle), by touch (placental pulsation of Gendrin), have no real value.

b. Accouchement.—To complete the history of placenta prævia during the period of opening of the cervix, it is sufficient to add the signs furnished at this moment by digital examination. The dilatation of the external os permits us to arrive directly on the placenta, in case the insertion is partial or central. An unequal spongy body is then felt, quite different from the membranes. In cases of marginal or lateral insertion, the placenta can only be felt by introducing the finger quite far into the uterus, but in these cases, when the sac is intact, an experienced finger can devine from the thickness and the inequalities of the menbranes the vicinity of the placenta.

During labor, if premature rupture of the membranes does not take place, various conditions may be produced. The bag of waters may be regularly formed and evolved as usual (marginal or lateral insertion). Again, this sac is constituted in part by the placenta and in part by the membranes (partial insertion), rupture occurs, by preference, at the union of the placenta and the membranes, the placental flap being thrown aside by the fœtal part in its descent. Or, finally, the placenta alone takes the place of the bag of waters (central insertion) and in such cases two circumstances may exist, either the fœtus passes through the placenta, rupturing it, or it pushes this organ before it. It is useless to say that in the latter case the death of the fœtus is certain.

Prognosis.—The prognosis is grave for the child, for about 50 per cent of fœti succumb. With regard to the mother, antisepsis has caused a great diminution in the danger of vicious insertion, since in place of 24 per 100 the mortality has fallen to about 5 per 100.

The gravity of the prognosis depends:

Upon the moment at which the first hæmorrhage appears—the earlier it takes place during pregnancy the darker is the prognosis, for, in general, the flow is as much more precocious as the placenta is near the internal os;

Upon the variety of the insertion—the more the insertion approaches the central variety the greater is its gravity;

Upon the resistance of the uterine orifice to dilation;

Upon the intensity of the uterine contractions;

Upon the fœtal presentation;

Upon the death of the child—the death of the fœtus occurring during pregnancy, retards the activity of the utero-placental circulation and consequently ameliorates the prognosis of the hæmorrhage;

Upon the treatment—the treatment followed plays a considerable role with regard to the prognosis.

Treatment.—The methods of treatment directed against placenta prævia are numerous. They are abridged in the following table:

- A. *Mother.*
  - I. In the struggle against the hæmorrhage.
    - 1. Method of Dubois, ergot (1836).
    - 2. Method of Seyfert, vaginal injection (1852).
    - 3. Method of Leroux, tampon (1776).
  - II. To open the cervix.
    - 4. Method of Guillemeau, forced accouchement (1571).
    - 5. Method of Barnes, rubber bags (1862).
    - 6. Method of Greenhalgh, induced accouchement (1865).
- B. *Ovum.*
  - I. Detachment of the placenta.
    - 7. Method of Simpson, total separation (1844).
    - 8. Method of Barnes, partial detachment (1862).
    - 9. Method of Bunsen, partial separation (1839).
  - I. Drainage of the liquor amnii.
    - 10. Method of Puzos, rupture of the membranes (1759).
    - 11. Method of Cohen, rupture after placental detachment (1855).
    - 12. Method of Deventer, perforation of placenta (1734).
  - III. Action on the fœtus.
    - 13. Method of Kristeller, fœtal expression (1865).
    - 14. Method of
      - *a.* Wigand, external cephalic version (1812).
      - *b.* Braxton Hicks, mixed podalic version (1864).
    - 15. Method of (no special name), extraction by the forceps, by the hand (with or without version), or by embryotomy.

It is impossible to treat in detail the description of these different methods and I shall confine the discussion to those that are indispensable in the treatment of placenta prævia during pregnancy, accouchement, and delivery of the appendages. In all the therapeutic measures it is the genital hæmorrhage that is always in view, which constitutes the principal accident of the vicious insertion and against which the treatment should be directed.

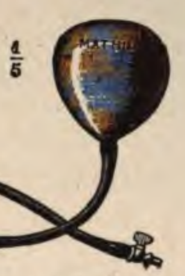

Fig. 387.—Gariel's pessary.

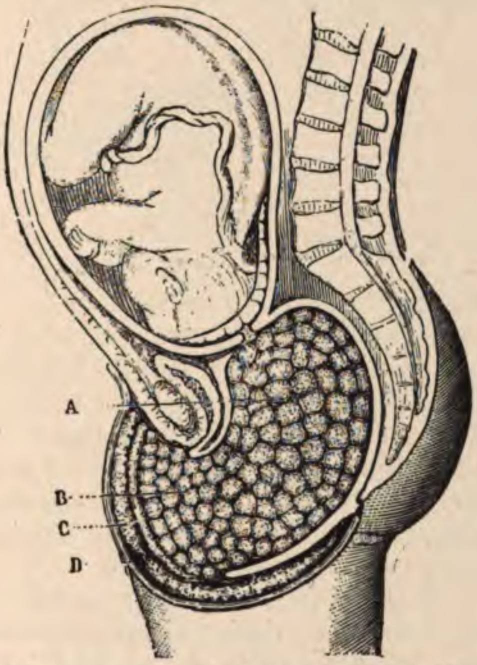

Fig. 388.—Tampon applied. A, deep rolls furnished with a thread; B, superficial free rolls; C, layer of charpie; D, T bandage.

a. Pregnancy.—If the hæmorrhage be slight simple expectation is necessary; if, on the contrary, it be serious, recourse should be had first to vaginal tamponnement (Fig. 388), then, if this fail, to rupture of the membranes, preceded or followed, at need, by the application of Barnes' rubber dilator. The most simple means for vaginal tamponnement is Gariel's pessary (Fig. 387). But if the inflated rubber-bag is not sufficient, the more complicated method of packing the vagina with rolls of absorbent cotton or charpie becomes at once necessary. For this purpose there are necessary balls of lint and a fatty body. The balls may be made of absorbent cotton or of ordinary lint, of which the quantity sufficient to fill a tall silk hat, according to M. Pajot, will be needed. The balls, of which sixty will be required, should be about the size of a small nut, and be strung upon a thread, a short distance apart, like the tail of a kite, or may be put upon separate threads. The balls are to be carefully immersed in an antiseptic solution (phenic acid $\frac{1}{50}$, boric acid $\frac{1}{25}$, or preferably bichloride of mercury $\frac{1}{1000}$), in which they should remain until thoroughly impregnated with the solution. Before introduction they should be squeezed dry.

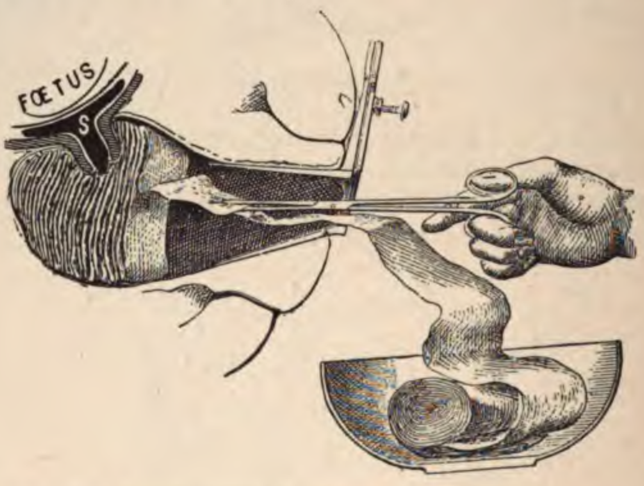

FIG. 388 *a.*—Introduction of the band for vaginal tamponning.

2. Position of the woman. In general tamponnement is made with the woman in the dorsal position, the limbs slightly apart. The English prefer the lateral position upon the left side. Some accoucheurs put the woman in the obstetrical position, that is, across the bed, with the buttocks upon the edge of the mattress, and with two assistants each holding a leg.

3. Introduction and placing of the balls. After having

cleared the vagina of all clots and washed it out with antiseptic injection; after having emptied the bladder and removed all fæcal matter from the rectum with the aid of a lavage, the balls attached to the threads are introduced one by one, with or without the aid of a speculum, better without, to the depth of the vagina until the cavity is completely filled.

4. Fixing the tampon. To fix the tampon in place a layer of lint, previously dipped in an antiseptic solution, is applied over the vulva, extending over the perinæum, above which is fixed a T bandage in the manner shown in Fig. 389.

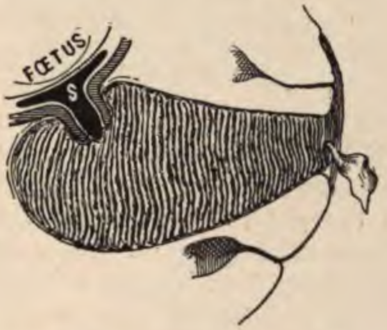

FIG. 388 *b.*—Tamponning completed.

The tampon should not be left in place more than twelve hours; if left longer it exposes the woman to the dangers of compression and of septicæmia. Different circumstances may necessitate its removal in less time. An elevation of the patient's temperature, severe pains, sometimes intolerable; finally the appearance of expulsive efforts indicate that the expulsion of the fœtus is at hand.

Here an important question arises. Should the tampon be removed before the period of expulsion or should it be left to be expelled by the efforts of the mother, first of the tampon, then of the fœtus? Two opinions have been entertained, the one by M. Depaul, who advises the removal of the tampon upon the appearance of the expulsive pains, and the termination of the accouchement as quickly as possible either by version or with forceps; the other by M. Pajot, who advises leaving it in place and to leave the expulsion to nature the same as that of the infant. To decide between these two methods is difficult, as no statistics exist to show their relative value. With a woman who, during the expulsive period, has energetic utero-abdominal contractions, and particularly if the infant is dead, the expectant method will be advisable. If the uterine contractions are rare, however; if the infant is living and in danger of succumbing, it is better to remove the tampon and deliver as quickly as possible. In a word, it is impossible to give a general and absolute rule. Each case has its special indications, which the clinician should be able to appreciate.

Tamponnement with iodoform gauze (Figs. 388 *a*, 388 *b*). I have described in detail *tamponnement* with the balls, because it is much in favor with many obstetricians and may be regarded as the classic method, but I greatly prefer *tamponnement* with iodoform gauze. The bands of gauze which I use are saturated with $\frac{1}{20}$ of iodoform and measure 5 metres (40 inches) in length by 15 centimetres (6 inches) in breadth; three or four are necessary for *tamponnement*. The gauze is introduced with the aid of the speculum, for it slips less easily than the balls of cotton; and directed with the finger into the different parts of the vagina it forms a more complete stoppage of the vagina than the classic method. The gauze does not require all the preparation and the physician can always have some rolls in his bag. The other details are the same as with the other varieties of tampons. After application the tampon is fixed in place and supported by a T bandage (Fig. 389).

If, in spite of the application of the tampon, the hæmorrhage continues and consequently becomes menacing, more active measures are necessary, that is, the interruption of pregnancy by a premature accouchement. Two cases may present:

(1). *Where the membranes are easily accessible.*—Multiparæ, with gaping cervix and with a marginal or a partial insertion of the placenta. The membranes can then be largely ruptured with the nail or a blunt instrument, so as to free the placental border to a sufficiently large extent, after being previously assured that there exists a presentation of the vertex or breech. Any other presentation than that of the vertex should first be converted into a breech by external or mixed manœuvres, and one of the lower limbs drawn into the uterine opening as soon as possible, by the method of Braxton Hicks soon to be described. In cases of vertex presentation, after the rupture of the membranes, a Barnes' dilator (Fig. 390) will be applied in the cervix, so as to induce and to hasten labor.

(2). *The membranes are not easily accessible.*—Primiparæ, with a closed cervix, and with partial or central insertion of the placenta.

In such cases, the dilatation of the cervix is begun with a Barnes' rubber-bag, preceded at need by the introduction of the finger to facilitate the passage of the dilator. At the end of some time the rubber sac is withdrawn, and, if the membranes are accessible, they are ruptured, as in the preceding case. If the opening of the cervix is still insufficient, a dilator of larger size should be applied and after another interval the membranes will again be sought. In cases of inaccessible membranes, Cohen's method consists in detaching the placenta with the fingers in a given direction until the membranes are found and perforated, liberating a placental flap which can be applied against the uterine wall; the difficulty in this theory consists in devining the side of the placenta at which will be found the shortest way to the appendages.

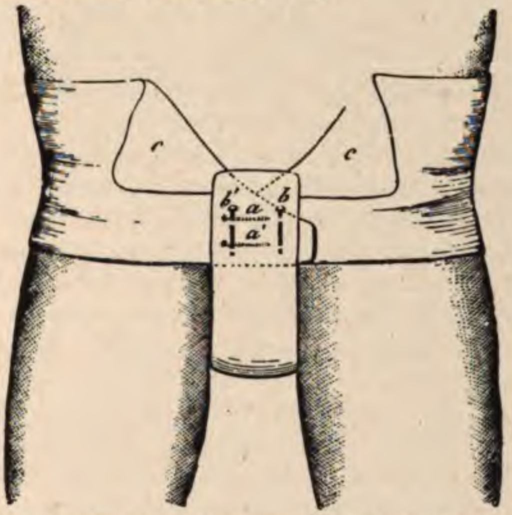

FIG. 389.—T bandage holding the tampon (Bailly). *c c*, the two ends of the bandage are turned back leaving the abdomen completely free.

b. Labor.—Intervention should have place only when the hæmorrhage is serious. Let us distinguish two cases, presentation of the vertex and presentation other than the vertex.

1. *The vertex presents.*—The best and most simple method is that of Puzos, that is, artificial rupture of the membranes followed by the application of Barnes' dilator when the dilatation is less than two finger's breadth. If the membranes are inaccessible the procedure is commenced by the application of Barnes' dilator, as has been indicated in the treatment during pregnancy.

2. *Presentation other than vertex.*—In such cases Braxton Hicks' method should be resorted to; if the breech presents it is sufficient to draw a foot down into the pelvis; if not, after previous rupture of the membranes, podalic version is performed by mixed manœuvres, terminating in drawing a foot down. When dilatation is

insufficient, or the membranes inaccessible, a Barnes' dilator is applied, as before, to facilitate the intervention by a previous dilatation.

If Puzos' method or that of Braxton Hicks does not succeed in arresting the hæmorrhage, which is quite exceptional, and if the condition of the woman appears serious, one should have recourse to forced accouchement (method of Guillemeau). This method consists in applying the forceps on the vertex as soon as the dilatation of the cervix will permit the introduction of the blades, or in making extraction as soon as a foot can be brought into the vagina. But forced accouchement should only rarely be practiced on account of the uterine lacerations to which it exposes.

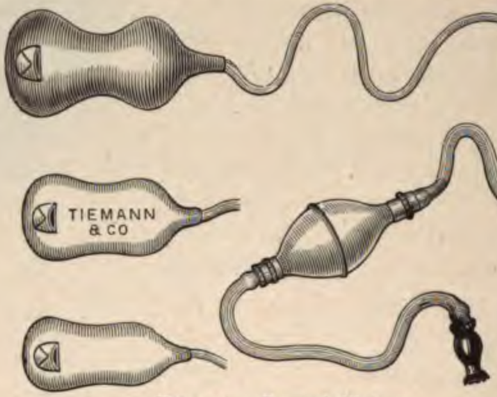

FIG. 390.—Barnes' dilators.

c. Delivery of the appendages.—If a hæmorrhage occurs at this moment, the usual conduct in such cases is followed.

d. Stimulant and reparative treatment.—When the woman becomes anæmic in consequence of an abundant hæmorrhage, susceptible even after delivery of exposure to fatal syncope, one or more of three stimulants should be used—alcohol internally, ether subcutaneously, heat to the periphery and internally at need (hot drinks).

Finally, in grave cases transfusion of blood should be used, but in place of the ordinary transfusion, which requires a special apparatus, the auto-infusion of Dr. Prouff should be used. This consists in compressing the lower limbs, and the upper if necessary, by a rubber band, pushing the blood from the extremities toward the trunk. The compression of each lower limb causes the reflex of 120 to 150 grammes of blood, equivalent to a transfusion of the same amount of blood (about three hundred grammes for both lower limbs).

CHAPTER XXI.

DISEASES OF THE OVULINE ENVELOPES.

1. *Amnion.*—Inflammation of the amnion is generally admitted. The result of this may be the augmentation of the liquor amnii and the formation of amniotic bands connecting the surface of the amnion and the fœtus.

2. *Chorion.*—Besides the hydatiform mole, already noted, there is observed either an hypertrophy of the villi or an hypertrophy as a whole with numerous nodules (chronic inflammation).

3. *Deciduas.*—Inflammation of the connective tissue framework produces diffuse endometritis; that of the cells of the decidua, polypoid endometritis, that of the glands, cystic endometritis. These various varieties of endometrites which especially affect the uterine and the utero-placental deciduas are a cause of abortion. Atrophy of the decidua, which has been considered as a possible cause of abortion, is scarcely known.

Hydrorrhœa occurs after the second month of pregnancy, most often during the last three months, as a sudden loss of a liquid analogous to that contained by the amnion. Sometimes its flow is remittent, sometimes intermittent, and after each abundant flow of liquid the patient notes a diminution in the size of the abdomen. This aqueous loss comes from the ovum and it terminates in one of two ways: either the flow ceases and pregnancy continues its course to normal term, or there is premature expulsion of the ovum. In a pathological point of view, two varieties of hydrorrhœa are accepted to-day. One, without rupture of the ovum, is a decidual hydrorrhœa, caused by a more or less localized inflammation of the decidua and its glands. The other is an amniotic hydrorrhœa constituted by a premature rupture of the membranes.

The treatment of hydrorrhœa consists, in part, of repose in bed or in a recumbent position, in part of quieting the uterus by viburnum prunifolium or opiates, as if in menacing abortion. This prolongation is only in the interest of the fœtus and will not be carried out if it is dead.

4. *Cord.*—The length of the cord, which measures on the average a half metre, between 0 and 3 metres. Excess of length exposes to procidence and to circles around the child; brevity, to more serious consequences. During pregnancy shortness of the cord may be the

cause of a sharp pain in a localized region of the uterus, of a vicious presentation, and sometimes of detachment of the placenta, a source of hæmorrhage. During labor the same disadvantages may be observed and also a certain slowness in the dilatation of the cervix, due, without doubt, to the obstruction to the free descent of the fœtus. It is then sometimes necessary to use manual extraction or the forceps, with the possible consequence of death of the fœtus and rupture of the cord.

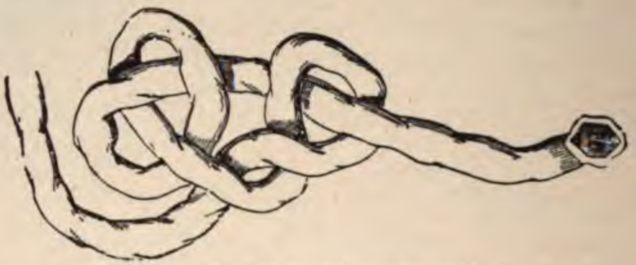

FIG. 391.—Knot of Baudeloque (Charpentier).

Knots in the cord, which form under the influence of the evolutions of the child, may present varied appearances (Fig. 391). Their practical importance is nul, for, contrary to what might be supposed, they are incapable of completely interrupting the funicular circulation.

Exaggerated torsion of the cord on itself is capable of causing the death of the fœtus, but this cause should be considered as exceptional.

Obstruction of the funicular vessels may also be caused by intrinsic causes, such as phlebitis of the umbilical vein, malformation of the cord, shortness, tumors, or simple stenosis of the vessels.

5. *Liquor amnii.*—*Hydramnios.*—Whenever the quantity of the liquor amnii exceeds one thousand grammes we have hydropsy of the amnion. It occurs in the proportion of one to one hundred pregnancies. In a general way, we may say that hydramnios has a pathogeny analogous to all the hydropsies, its source is in a circulatory obstruction. With regard to the fœtus, we recognize three causes:

1. Syphilis, which acts through the hepatic or the placental lesions which it causes, both being a source of circulatory disturbances.

2. Malformations, indicating a vice in the constitution of the fœtus, in which the circulation becomes insufficient.

3. Twin pregnancy, where the circulation of one fœtus is obstructed by the more vigorous. Sometimes the two circulations are mutually interrupted, producing hydramnios of both amniotic membranes.

With regard to the mother, the causes are the same as those which produce dropsy, œdema, and anasarca. Thus hydramnios is often seen to coincide with these different diseases of the pregnant woman.

Symptoms. — Hydramnios is manifested under two forms, acute and chronic.

The chronic form begins insiduously; the exaggeration in the quantity of liquid becomes notable after the fifth or sixth month. The abdomen is abnormally developed. There are abdominal and lumbar pains, respiratory obstruction, and very clear sensation of the active movements of the fœtus.

The acute form produces rapid development of the abdomen, giving rise to the same physical signs as the preceding. But the functional troubles here take a pronounced gravity; the pains are acute, the respiration is difficult, the face is bluish, and there is frequent and obstinate vomiting. The termination takes place by death (when not interrupted by active intervention), by expulsion of the ovum, or by transformation into the chronic form, with attenuation of the symptoms.

The chronic form is relatively benign, but it exposes to premature accouchement, to vicious presentations, to procidence of the cord, and to slowness of labor.

The acute form is grave for it most often terminates in the death of the woman or in the premature expulsion of the ovum. In hydramnios of both varieties, eclampsia and grave hæmorrhages are to be feared.

The prognosis, with regard to the child, depends as much on the cause of the hydramnios (syphilis, malformations, etc.), as on the hydropsy itself.

Treatment. — *Chronic form.* — Simple expectation during pregnancy. At the moment of labor the membranes should be ruptured early in cases where the three following conditions are united: slow contractions, vertex presentation with marked engagement, cervix effaced and offering a dilatation of, at least, two fingers' breadth.

Acute form.—If the rapidity of the accidents menace the patient's existence we are authorized to have recourse to a capillary puncture of the ovum (through the abdomen or vagina) or to an induced accouchement.

Deficiency of the liquor amnii.—*Hypoamnios.*—A want of amniotic liquid predisposes to deformations of the fœtus, and during labor to a slow and difficult progression of the fœtus, on account of the dryness.

CHAPTER XXII.

DISEASES AND DEATH OF THE FŒTUS. FŒTAL DYSTOCIA.

1. *Excess of the volume of the fœtus.*—The excess of the volume of the fœtus may be simple or pathological. It is simple when there is an exaggeration of the fœtal development, without trace of disease. If pathological, it comprehends all the causes capable of producing hypertrophy of a fœtal region; such are, hydrocephalus, hydrothorax, ascites, tumors, monstrosities, etc. Each of these causes will be studied separately. First we shall take into question simple excess of volume.

Simple excess of volume may be generalized or localized.

It is generalized when a well-proportioned child presents a development superior to that ordinarily observed. In the place of three kilogrammes it weighs four, five, or even more. The obstacle to accouchement becomes the same as that created by a deformed pelvis with a fœtus of normal size and, at the moment of accouchement, the management will be the same. Some women present an excess of fœtal volume at several consecutive pregnancies and the question of premature accouchement will present itself in such cases, for this will sometimes be the only way of having a living child. The epoch at which this should take place will be fixed by the study (by palpation) of the relation existing between the size of the head and the pelvic canal.

The hypertrophy is localized when there is relative excess in the volume of the head, of the shoulders, or of the breech. The excess of the volume of the shoulders is the only one proven. It may become an obstacle to accouchement whether the head presents first or last. In cases of presentation of the vertex, when the head no longer advances, before or after having opened the vulva, the shoulders being arrested at the superior or at the median strait, the forceps will bring the head outside the vulva. Then if simple tractions are not sufficient to cause descent of the shoulders, the two arms should be successively sought and brought down, the anterior first. The shoulders then engage without difficulty and the child may be extracted. In cases of the head coming last, the same manœuvres should be used.

2. *Hydropsias.—Hydrocephalus; Hydrothorax; Ascites.*

Hydrocephalus is constituted by an abnormal accumulation of serous liquid in the cranial cavity. Hydrocephalus may exist alone or it may be complicated by hydrorhachis, spina bifida or some other fœtal malformation. The size of the head is variable. The increase is made at the expense of the cranial vault (Fig. 392). Its frequency is about 1–2000. Its causes are not well known. Syphilis, cretinism, and consanguinity have been noted.

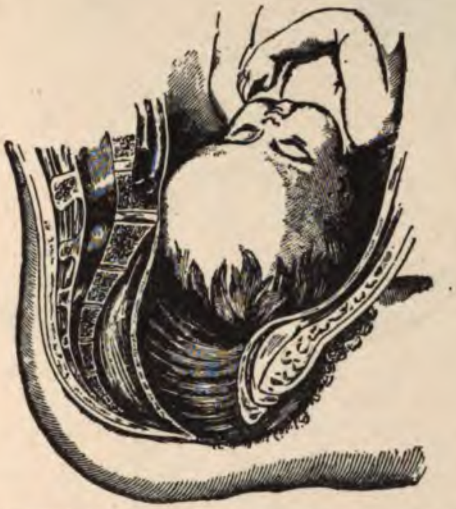

FIG. 392.—Hydrocephalic head, retained at the superior strait (Playfair).

During pregnancy hydrocephalus may be suspected from the size of the head, revealed by palpation. In general, it is at the moment of labor, when the dilated cervix permits access, that the diagnosis becomes possible. It will then be made when the head comes first by the recognition of large fontanelles, and of the unusual interval between the sutures. When the head comes last manual exploration leads as before to a diagnosis from the condition of the sutures.

At the moment of labor the management will vary according as there is a presentation of the cephalic or of the cormic ovoid.

Presentation of the cephalic ovoid.—Expectation until complete dilatation is the rule. If the head does not engage an application of the forceps should be attempted. If the forceps fail, recourse should be had to capillary puncture of the cranium through a suture or a fontanelle, without removing the forceps, and the tractions should again be resumed after evacuation of the liquid. Embryotomy constitutes the ultimate resource.

Presentation of the cormic ovoid.—The difficulties only exist for the extraction of the head. This will be successively attempted as above by the aid of manual tractions after the evacuation of the liquid or after embryotomy. The evacuation of the fluid may be obtained by capillary puncture of the cranium, or by Van Huevel's method (Fig. 393) which consists in cutting the vertebral column transversely and passing a sound by this opening through the spinal canal into the cranium.

Hydrothorax only exists as a complication of ascites.

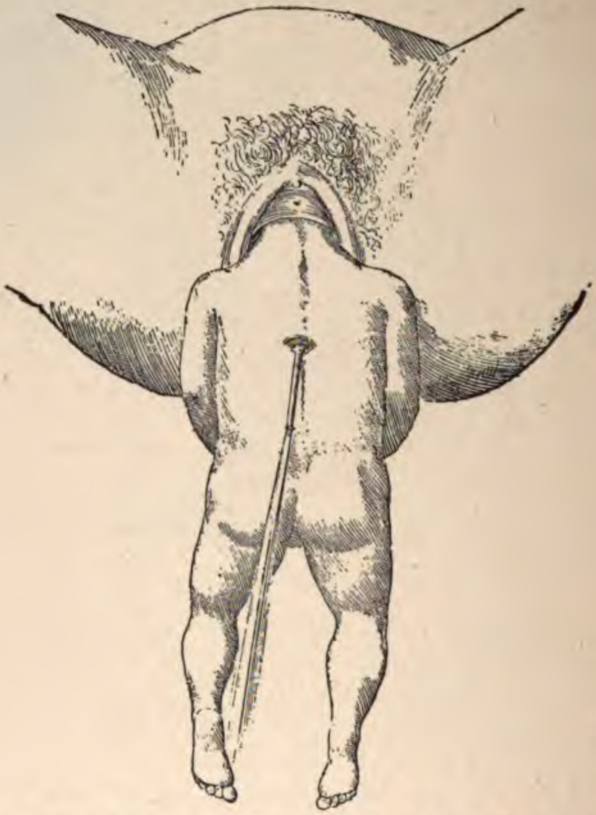

FIG. 393.—Evacuation of the hydrocephalic liquid by the spinal canal (Van Huevel).

Congenital *ascites* is very rare and most often coincides with a certain degree of peritonitis. The diagnosis can only be made at the moment of labor, when there exists difficulty in the extraction of the trunk. Treatment: evacuation by puncture.

3. *Diseases of the urinary apparatus.*—Retention of urine, which accompanies imperforation of the urethra, may produce a considerable distention of the abdomen (Fig. 394). It requires the same treatment as ascites.

4. *Diseases of the bones and of the articulations.*—Intra-uterine fracture of the fœtus may be traumatic, and due to a blow affecting the abdominal region of the mother, or spontaneous, and produced by an osseous friability caused by rachitis.

Congenital luxations may attack nearly all the articulations but those of the hip joint are most frequent. The spontaneous luxations should be distinguished from those produced during delivery under the influence of an obstetrical intervention and which are relatively rare.

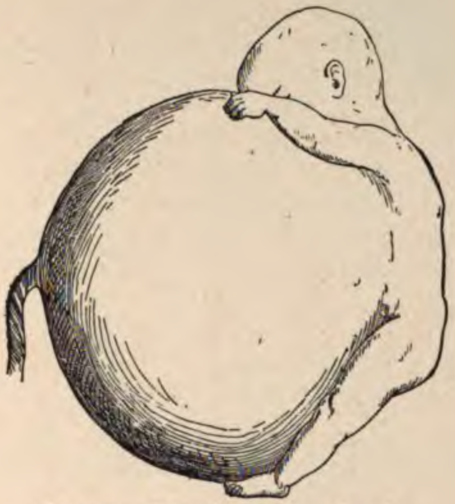

FIG. 394.—Retention of urine (Portal).

Intra-uterine rachitis causes a deformation of the skeleton, especially resulting in shortness of the upper and lower limbs.

Fœtal ankylosis is characterized by a stiffness of the majority of the articulations. The fœtus remains as if congealed in the attitude that it has in the uterus. From this proceeds possible difficulties for extraction. The nature of these ankyloses is still unknown.

5. *Various tumors.*—Spina bifida. Sacral hygroma. Fibromata. Sarcomata. Generalized œdema and emphysema.

6. *Congenital amputation.*—The child is born with a lower or an upper member missing. The divided member terminates in a regular stump.

There are two theories as to causation: One, that the circular strangulation is produced by the umbilical cord or by a pathological amniotic band. The other, that the production of a cutaneous cicatrix in consequence of a local inflammation results in a progressive stricture terminating in gangrene of the subjacent parts of the limb.

Death of the fœtus.

The death of the fœtus may be real or apparent. The death is *real* when the fœtus cannot be recalled to life by any known means, it is *apparent* in the contrary case. Death of the fœtus taking place during pregnancy will be necessarily real on account of the time that separates it from birth. But death occurring during labor will sometimes be real and sometimes apparent according to the duration before expulsion and also to the cause producing it. It will be seen, then, leaving aside the ætiological element, that during accouchement the difference between real and apparent death is constituted by a question of time; both are degrees of the same accident, apparent death ends in real death if it is prolonged.

These intimate connections make it better to unite in the same chapter the study of these two varieties of death; after having examined their ætiology, common to both at least during labor, we will discuss separately the pathological anatomy, the symptoms, the diagnosis, the prognosis, and the treatment.

Ætiology.

I. *During pregnancy.—Real death.*

a. Traumatic causes:
  1. Maternal traumatism, genital or perigenital.
  2. Ovuline traumatism, attacking the ovum or the fœtus directly.

b. Non-traumatic causes.
  Father:
    1. General state:
      1. Advanced age; debilitation from excess.
      2. Poisoning: Lead, tobacco, alcohol.
      3. Syphilis, scrofulo-tuberculosis, diabetes, albuminuria.
    2. Localized states:
      1. Any defect of the genitals.

  Mother:
    1. General state:
      1. The same as for the father.
      2. Any grave disease occurring during pregnancy.
    2. Localized state:
      1. Periuterine or uterine affection (including tumors).
      2. Utero-placental hæmorrhage.

  Ovum:
    1. Appendages:
      1. Placenta: Apoplexy, degeneration, hydatiform mole.
      2. Cord: Compression, loops, torsion, knots.

2. Fœtus:
    1. Various diseases of the fœtus.
    2. Vices of conformation.
    3. Habitual death.
3. Extra-uterine pregnancy.

II. *During labor.—Real or apparent death.*

a. Traumatic causes.

1. Maternal traumatism, genital or perigenital, attacking the uterus through the abdominal wall or by the vagina.
2. Ovuline traumatism (version, forceps, embryotomy).

b. Non-traumatic causes.

Mother:

1. General conditions:
    1. Eclampsia.
    2. Asphyxia or grave asystole.
    3. Death of the mother.
    4. Any grave disease capable of determining premature accouchement may, at the same time, cause the death of the fœtus.
2. Localized conditions:
    1. Uterine or periuterine affections capable of seriously obstructing accouchement. Uterine tetanus.
    2. Utero-placental hæmorrhages.

Ovum:

1. Placenta: Extensive detachment.
2. Cord: Compression, loops, torsion, knots.
3. Fœtus.

    Too long duration of labor. Intra-cranial effusion. Presentation of face: compression of the vessels of the neck. Presentation of the breech: slowness of extraction of the head. In general, any difficulty of accouchement proceeding from the fœtus

I. *Real death.—Pathological anatomy.*—The fœtus having succumbed, if it is still in the embryotic state, may undergo a complete dissolution and disappear; if not, it becomes macerated. Maceration may be clearly distinguished from putrefaction, for it occurs without odor, without the production of gas, and does not expose the woman to any septicæmic accident.

In maceration there is a progressive softening of all the organs. The epidermis, upraised by phlyctenulæ, is detached to a greater or less extent. The liquor amnii becomes, successively, reddish, greenish, chocolate-colored, and grumous. The placenta appears as if washed out.

Maceration is produced when the membranes are intact and the fœtus isolated in the amniotic liquid. In cases of perforation of the membranes and access of air to the fœtus, putrefaction takes place.

Mummification is a variety of maceration in which the fœtus becomes desiccated.

Lithopædion is only produced in cases of extra-uterine pregnancy.

Symptoms.—a. During pregnancy.—

1. *Interrogation.*—Establishment of the lacteal secretion, analogous to that occurring after delivery. Cessation of the sympathetic phenomena. Diminution of albuminuria in cases where it exists. Diminution of varices. Cessation of the fœtal movements, when they have already been perceived. Special sensation of weight, of an inert mass in the abdomen.

2. *Inspection.*—No special sign.

3. *Palpation.*—The sensations furnished by the fœtus become more and more vague. Uterus stationary or diminishing in volume. Sometimes a sensation of crepitation caused by the over-riding of the bones of the head.

4. *Auscultation.*—Fœtal silence. Rustling isochronous with the pulse of the mother, indicated by Stoltz (?).

5. *Digital examination.*—Furnishes only little information during pregnancy, sometimes permitting, however, the perception of the mobility and even the crepitation of the bones of the cranium.

b. During labor.—Same results as during pregnancy, afforded by interrogation, palpation and auscultation.

Inspection.—Flow of liquor amnii, greenish, reddish or chocolate color.

Digital examination.—

Vertex presentation—over-riding and mobility of the bones.	Epidermic exfoliation.
Face presentation—mouth, no suction.	
Breech presentation—anal sphincter, no contraction.	
Thorax presentation—hand, no movement.	

The treatment will be addressed to the cause that is supposed to have produced the death of the fœtus. Syphilis occupies the first rank here. Under ætiology I have mentioned habitual death of the fœtus. This term is used to designate the death of the fœtus occurring during a series of pregnancies at about the same epoch. The treatment in such cases consists in inducing accouchement some days before the usual period at which the fœtus succumbs, to allow delivery of a living and viable child. That is to say, that intervention will be useless in cases where the habitual death occurs before the beginning of the seventh month.

II. *Apparent death.*—The child born in a state of apparent death presents, according to the cases, two absolutely distinct appearances:

It sometimes appears *violaceous,* all the peripheral vessels are engorged with blood, the pulsations of the heart are clearly perceptible; the prognosis is relatively benign.

It sometimes appears *white,* the skin seems deprived of blood, the pulsations of the heart are feeble, sometimes nul, or difficult to perceive; the prognosis is relatively grave.

In the first case there is respiratory syncope, asphyxia, properly so-called, due to arrest of the placental function, pulmonary respiration being not yet established. In the second case there is cardiac syncope, complete or incomplete. The first form quickly ends in the second, the respiratory syncope conducing to the cardiac. If the cardiac syncope lasts a certain length of time (difficult to state precisely) apparent death gives place to real death.

At birth, the absence of respiratory movements and of cries indicates plainly the grave state in which the child is found. To know if the death is real or apparent, the condition of the heart must be observed by grasping the umbilical portion of the cord or by applying the hand or the ear on the præcordial region. Whenever the pulsations are perceptible, death is only apparent. If the pulsations are nul insufflation will be attempted for about half an hour, and if after this time no pulsation can be perceived it may be concluded that death is real.

Treatment. — The mouth and the pharynx should be cleansed of mucus by the finger covered with a soft cloth. The treatment consists in attempting to arouse cardiac action by insufflation, or by other means intended to re-establish the respiratory function.

a. Methods other than insufflation:

1. Bleeding of the cord.—Generally abandoned at present.

2. Electricity.—Interupted currents, one pole on the vertebral column at the upper part of the dorsal region, the other moved over the pectoral region from side to side.

3. Cutaneous excitation. — Simple frictions, alcohol along the vertebral column, flagellation, hot baths or alternately hot and cold plunge baths.

b. Insufflation.

Indirect insufflation.—1. Marshall Hall.—The child is laid on the abdomen, then turned on the side and finally given a sudden movement replacing it in its first position. This is performed fifteen to twenty times a minute.

2. Schultze.—The child is grasped by the shoulders, the abdomen turned forward, and by a movement through the arc of a circle it is carried upward, as if turning a summersault, then it is lowered

by a movement in the opposite direction. The elevation produces expiration, the descent inspiration.

3. Sylvester.—The child is grasped by the breech and the neck and given a sudden movement, parallel to itself, of elevation (expiration) and of descent (inspiration).

4. Howard.—Respiratory movements are given to the thorax, either directly by the hands or by raising and lowering the arms.

5. Woilez.—Spirophore, a case enclosing the child to which respiratory movements can be given.

All these methods of indirect insufflation afford actual service but are inferior to direct insufflation.

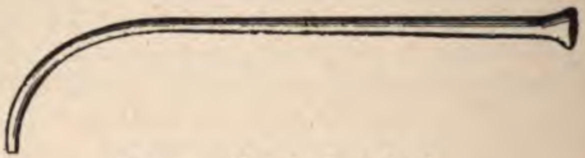

FIG. 395.—Chaussier-Depaul's tube.

Direct insufflation may be made mouth to mouth or by the use of the laryngeal tube. As the former method is often repugnant insufflation by means of the laryngeal tube is generally preferred. For this purpose Chaussier has invented a metallic tube that has been slightly modified by Depaul (Fig. 395). This tube is introduced into the larynx under the guidance of the finger (Fig. 396) and serves to inflate the lungs.

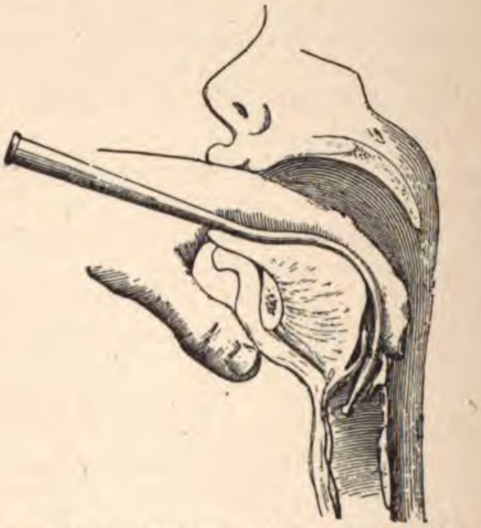

Fig. 396.—Application of the insufflator (Ribemont's tube).

How long should insufflation be continued? If the child returns to life little by little, as indicated by the increasing frequence of the spontaneous inspirations, the insufflations should be continued until respiration occurs ten to fifteen times a minute.

But if the return to life is slow to appear, at the end of what length of time should we despair? The management may be summed up in the following propositions:

1. If after a half hour of insufflation, the pulsations of the heart are nul, it is useless to continue; the death is real.

2. When the cardiac pulsations exist, if after an hour of insufflation no spontaneous movement of respiration is produced, the efforts may be discontinued, for this absence of respiratory movements indicates that the child has undergone some lesion incompatible with the re-establishment of life.

3. If after two hours of insufflation, and when cardiac pulsations and some spontaneous respirations exist, the movements diminishing and tending to disappear as soon as insufflation is interrupted, it will be useless to continue longer, the conditions necessary to life being wanting, as in the preceding case

Teratology.—I shall only give here a very short glance at this question, by conforming to the classification of Saint-Hilaire. The teratology comprises the hemiterias, the heterotaxias, the hermaphrodisms and the monstrosities.

1. *Hemiterias.*—Among the principal hemiterias are:

Encephalocele, meningocele, spina bifida. Harelip.
Imperforation of the œsophagus, of the anus, of the urethra.
Diaphragmatic and umbilical hernias. Cardiac ectopia.
Non-descent of the testicles.
Hypospadias. Epispadias.
Duplicity of the uterus and of the vagina.
Polymazia. Polydactylism.
Clubfoot.

2. *Heterotaxias.*—Total or partial splanchnic version. The organs occupy a position other than normal.

3. *Hermaphrodisms.*—Hermaphrodism is designated the reuion, in the same individual, of the male and female genital organs, one or the other being anatomically or physiologically incomplete.

4. *Monstrosities.*

a. Simple monsters, in which a limb or the head is wanting.

b. Composite monsters formed by the fusion of two or three fœti simultaneously developed in the uterine cavity.

CHAPTER XXIII.

MULTIPLE PREGNANCY.

Two to five fœti may be simultaneously contained in the uterine cavity. Multiple pregnancies of more than five children are not clearly proven. In the study of multiple pregnancy we shall adopt the following plan:

I. Twins.
  A. Pregnancy.
  B. Accouchement.
    a. Eutocia.
    b. Dystocia.
II. Three to five children at a birth.

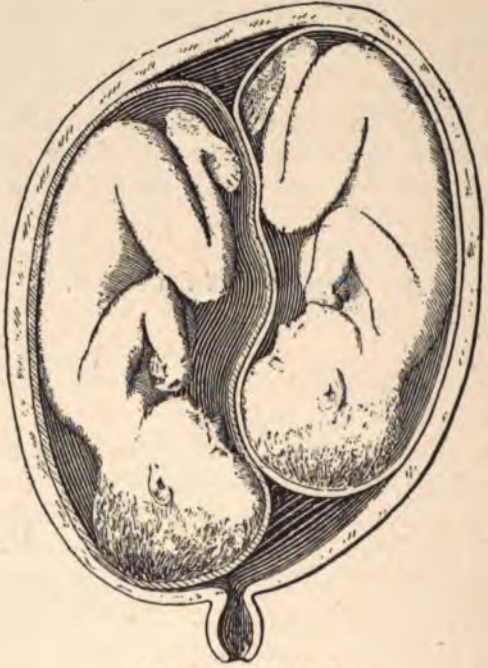

FIG. 397.—Fœti in 9 9.

I. Twins.—A. *Pregnancy.—Physiology.*

a. Fecundation.—Sometimes the two children are conceived simultaneously, sometimes there is a variable interval between them. In the first case there is simultaneous fecundation; in the second, superfecundation or superimpregnation.

Superfecundation is subdivided into superovulation, superembryonnement, superfœtation.

Superovulation.—The two successive fecundations very near, from some hours to eight days.

Superembryonnement.—The two successive fecundations are separated by an interval of eight days to three months.

Superfœtation.—The two successive fecundations occur at an interval greater than three months.

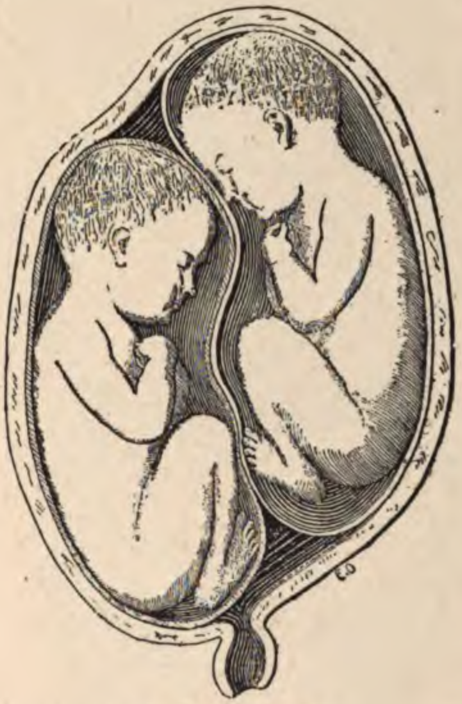

FIG. 398.—Fœti in 6 6.

The first two varieties are beyond doubt, but superfœtation is not generally admitted, for at this moment the two deciduas being united, communication between the vagina and the tubes is interrupted.

b. Disposition of the fœti.—The various dispositions may be arranged in three classes, lateral, where the twins are side by side; antero-posterior, one before the other, and lastly, superposed, one above the other. The first disposition is much the most frequent, the last two being exceptional.

I. *Lateral.*

1. Fœti in 9 9,* the two heads are below, one generally engaged, the other in the iliac fossa (Fig. 397).

2. Fœti in 6 6, the two breeches are below; one in relation with the superior strait, the other in the iliac fossa (Fig. 398).

3. Fœti in 6 9 or in 9 6 (Fig. 399).

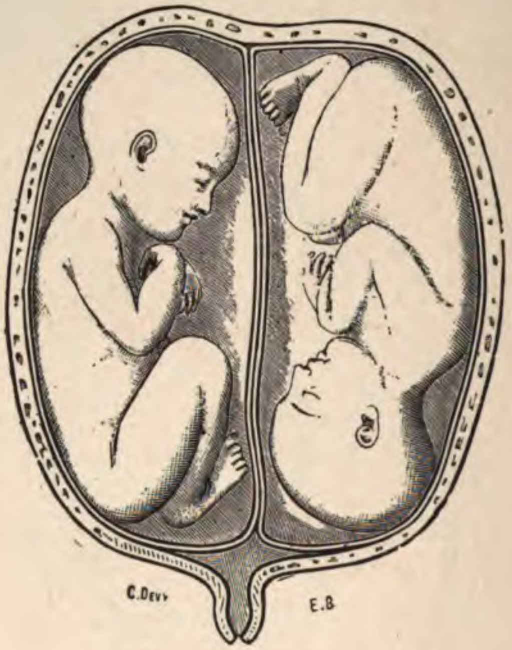

FIG. 399.—Fœti in 6 9 (Budin).

II. *Antero-posterior.*

4. The two fœti are placed one before the other (Fig. 400).

III. *Superposed.*

5. Fœti in T. The upper fœtus lies transversely at the fundus of the uterus, the lower is vertical, presenting by the breech or by the head (Fig. 401).

6. Fœti in ⊥ inverted. The upper fœtus is vertical, the head below or above, the inferior lies transversely in the pelvis (Fig. 402).

7. Fœti in hammock. The two fœti are transverse one above the other (Fig. 403).

c. Disposition of the appendages.

1. *Separation.*—The two ovuline appendages are completely dis-

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* I compare the fœtus to the figure 6, the rounded part representing the breech and the terminal part the head.

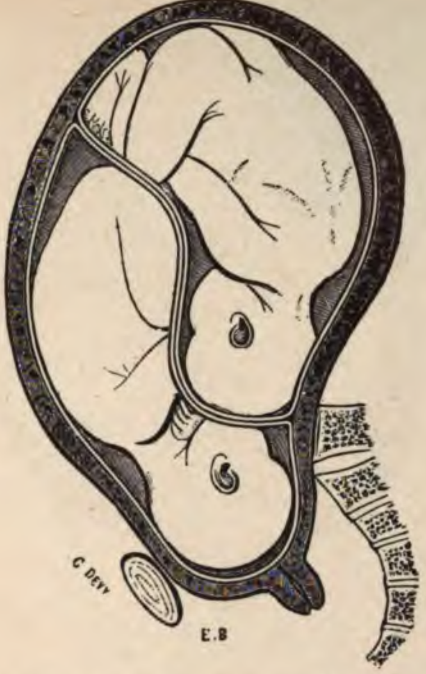


FIG. 400.—Fœti antero-posterior (Budin).

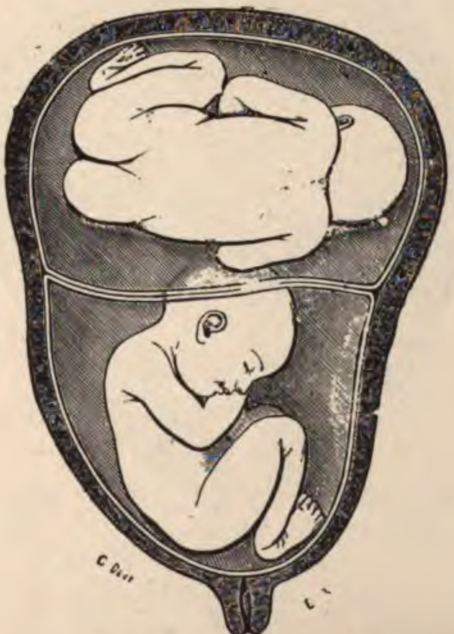


FIG. 401.—Fœti in T (Budin).

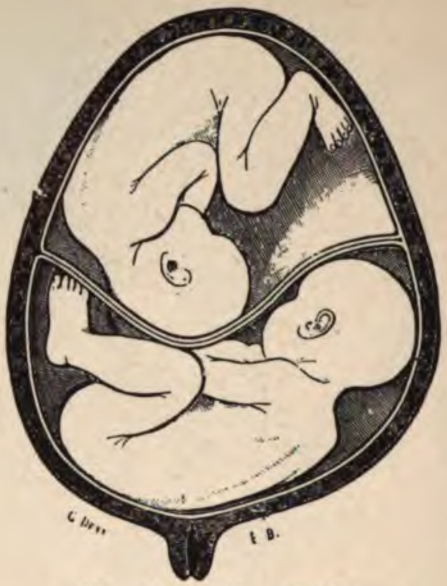


FIG. 402.—Fœti in ⊥ (Budin).

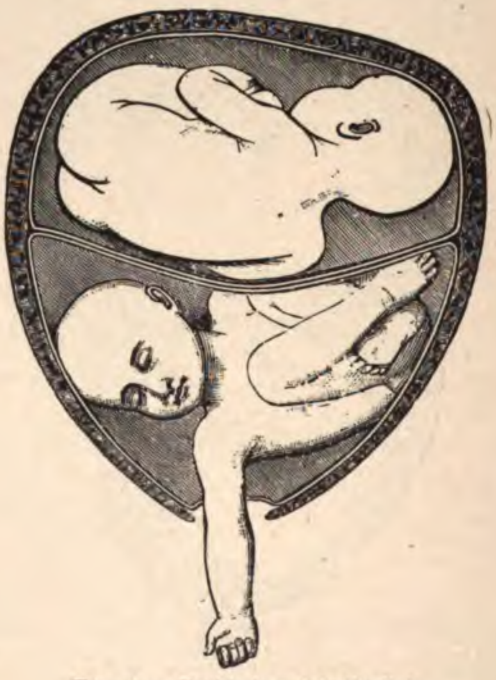


FIG. 403.—Fœti in hammock (Budin).

tinct. The septum which separates the two fœti is composed of the two amnions and of the two chorions, between which some elements of the decidua may be interposed (Fig. 404).

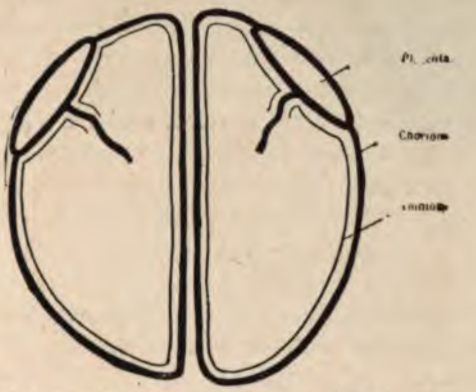


FIG. 404.—Distinct sacs: chorio-amniotic septum.

2. *Attachment.*—The two placentæ are united in a single mass in which the circulation of the two fœti is sometimes distinct, sometimes common. There is only a common chorion, but the two amnions constitutes distinct cavity for each fœtus. The septum is formed by the adhesion of the two amnions (Fig. 405).

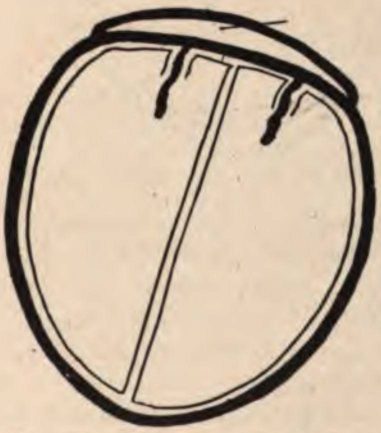


FIG. 405.—Distinct sacs: amniotic septum.

3. *Fusion.*—The placenta is common, as well as the circulation. The two fœti are situated in a single cavity and float in the same liquid; there is only one chorion and one amnion (Fig. 406).

Symptoms.—*Interrogation.*—Exaggeration of the malaise of pregnancy (?). Sensation of the fœtal movements over a great extent of the abdomen, or in two regions clearly separated from each other.

Inspection.—Exaggeration of the size of the abdomen in relation to the epoch of the pregnancy, as in hydramnios. Subpubic œdema, with or without œdema of the lower limbs, as in hydramnios.

Palpation.—Continued tension of the uterine wall, rendering exploration of the uterine contents difficult. Frequent depression of the fundus of the uterus, and vertically on the median line of the anterior face of the uterus (Herrgott). Palpation permits the discovery of two fœti, the different parts of which are recognized, as in simple pregnancy. Sometimes the four fœtal poles are easily perceived; sometimes three, or only two, are clearly perceptible, according to the different attitudes of the fœtus.

Auscultation.—The rule, if both fœti are living, is, that there exist two foci of auscultation in relation with the situation occupied by the cardiac zone of each child; exceptionally there exists only one focus, the situation of one fœtus interrupting the perception of its heart sounds.

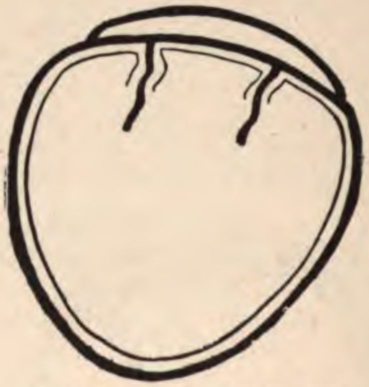


FIG. 406.—Fusion of the two sacs.

Digital examination.—When there is a vertex presentation, the ballottement is less clear and perceived with greater difficulty than in a simple pregnancy. In hydramnios the opposite is the case. Complete or incomplete effacement of the cervix before accouchement is frequent, as in hydramnios, in any over-distention of the uterus during pregnancy.

The diagnosis should especially differentiate from hydramnios. The distinctive signs are the palpation and auscultation of a single fœtus, the extended fluctuation in hydramnios and the perception of numerous small fœtal parts in twin pregnancy.

B. *Accouchement.*

a. Eutocia.—The first accouchement occurs as in a simple pregnany. After the expulsion of the first child it is necessary to place two ligatures on the cord, one fœtal, the other maternal, to avoid the hæmorrhage from the maternal end, as it would be fatal to the second child in case of a common circulation.

The time which separates the first accouchement from the second is usually a quarter of an hour; it may be shorter or longer, and lasts for eight or ten hours and even more. In fact, when, the two fœti being completely distinct, one fœtus has been expelled before term and with its appendages, the cervix may close and pregnancy continue its course to normal term, at which moment the second fœtus remaining intact will be expelled as in the case of simple pregnancy.

The second accouchement is reduced to the period of expulsion, for the dilatation being complete after the passage of the first child the second has only to traverse the open genital passage. The second fœtus will be preceded or not by a bag of waters, according as the amniotic cavity was single or double. This second accouchement is generally rapid.

The delivery of the appendages takes place after the expulsion of the two fœti, the two placentæ, united or separate, being expelled as a whole, as after simple accouchement. Exceptionally, the appendages of the first child may be expelled before the second accouchement. This delivery should be favored only in case the placenta is engaged in the vagina or occupies the passage which the second fœtus must follow.

b. Dystocia.—The dystocia may be of maternal or fœtal origin.

Maternal dystocia. — The various maternal complications (eclampsia, hæmorrhage, rigidity of the cervix, etc.) will be treated as in the case of a simple accouchement.

After the first accouchement, if the second delays, at the end of what time is it necessary to interfere? In case of pressing danger for the mother (hæmorrhage) or for the child (retardation of the cardiac pulsations) the accouchement should be terminated at once. In the contrary case, if the presentation is that of the vertex or of the breech, and if the cervix does not close, an hour's time should be allowed nature to act spontaneously, but if after an hour, delivery does not take place it is necessary to interfere and extract the child, for a longer delay offers no advantage and may be prejudicial for the child.

Exception: However, we are authorized not to interfere, even after an hour, when the three following conditions are united: 1. First ovum completely expelled (that is with its appendages). 2. Expulsion of the first ovum before term. 3. Mother in good condition. In these conditons, in fact, the pregnancy is capable of continuing to normal term and of permitting the ulterior development of the second fœtus without danger to the mother.

Fœtal dystocia.—This dystocia will vary with the relative situation occupied by the two fœti.

1. *Fœti in* 9 9.—The two heads may have a tendency to engage simultaneously at the superior strait. The head least engaged should be pushed back to permit the descent of the other.

2. *Fœti in* 6 6.—The difficulties arise in extraction, on account of the number of feet the hand may meet. Only one foot should be drawn on.

3. *Fœti in* 6 9 *or in* 9 6.—*a.* If the first fœtus presents by the vertex it is seldom that the accouchement presents any difficulty.

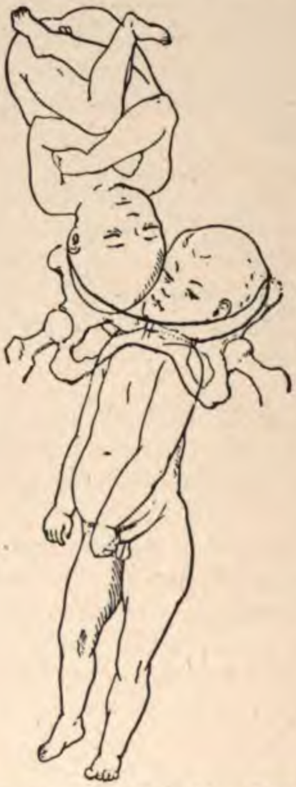


FIG. 407.—Cephalic locking (Budin).

b. When the first fœtus presents by the breech, difficulties arise at the moment of the passage of the head. This cephalic extremity is arrested by the head of the second (Fig. 407). The indications are, to attempt successively: 1. To push up the head of the second fœtus to permit the extraction of the first. 2. To apply the forceps on the head of the second fœtus (?). 3. Craniotomy on the head of the second fœtus, only in case it is supposed to be dead. 4. If the second fœtus is living, as the existence of the first is very much compromised by the situation in which it will remain some time, to resort to craniotomy or to decapitation of the first child in order to allow the extraction of the second child alive.

4. *Fœti antero-posterior.*—Same difficulties possible as in the first case, fœti in 9 9.

5. *Fœti in* T.—The only difficulty will be with regard to the second child which may present by the abdomen or by the thorax. Version by internal manœuvres after the birth of the first child.

6. *Fœti in* ⊥ *inverted.*—Three cases may be observed:

1. The first fœtus presents transversely and completely obstructs the superior strait. The first child should be extracted by version, or, if necessary, by embryotomy. If the second fœtus is easily accessible its extraction should first be attempted before resorting to embryotomy.

Then the second child, being insinuated between the first child and the uterus, thus descends to present, first, either by the vertex (second case) or by the breech (third case).

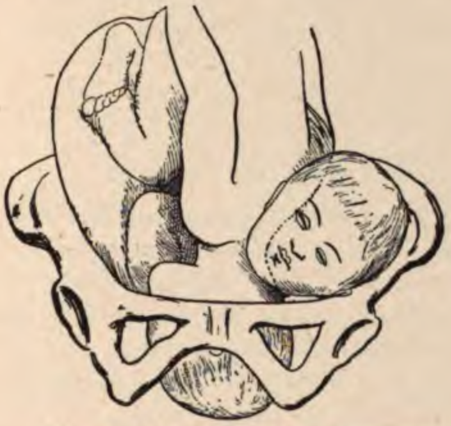


FIG. 408.—Locking of the fœti (Jacquemier).

2. *By the vertex.*—The shoulder of the child which presents by the vertex may be arrested by the neck of the fœtus placed transversely (Fig. 408). The indications are, to attempt successively: 1. To liberate the shoulders, if the introduction of the hand is possible. 2. To extract with the forceps the child which presents by the vertex. 3. To perform either craniotomy of the head which presents, or decapitation of the other fœtus, according to the relative facility of the operations, and according to the chances of life pertaining to one or the other child. To extract by internal version the child remaining in the uterus.

3. *By the breech.*—Possible locking of the head of the child engaged with the neck of the fœtus (Fig. 409). The indications are, to

attempt successively: 1. To liberate the engaged head with the hand. 2. To perform decapitation of one or the other child, indifferently, unless the fœtus remaining in the uterus is not dead. Then decapitation of the fœtus half expelled will be preferred, on account of the greater facility of the operation and the small chance of extracting the child living. The child placed transversely is brought down by internal version.

7. *Fœti in hammock.*—Spontaneous delivery is impossible. The two children will be successively extracted by internal version.

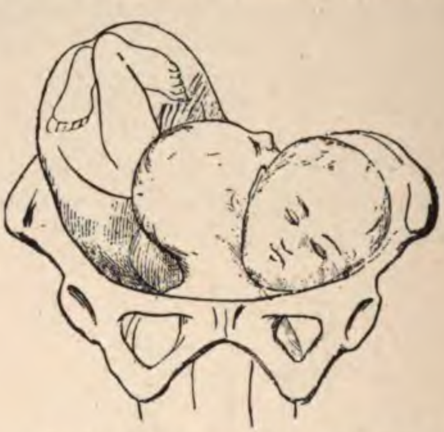


FIG. 409.—Locking of the fœti (Penard).

II. Three to five children at a birth—These pregnancies are extremely rare. Their diagnosis is possible before labor (Pinard). The knowledge of the difficulties that have drawn our attention to double accouchements permits us to surmount the causes of dystocia that may be met in these exceptional cases.

CHAPTER XXIV.

PREMATURE EXPULSION.

Premature expulsion is that which takes place before the normal term of the pregnancy, that is, before nine months, counting from the moment of conception. During the first six months (180 days) it is designated as abortion, and during the last three as premature accouchement. According to the epoch at which it takes place abortion is distinguished as embryotic (first three months) and fœtal (second three months).

Pathogeny and ætiology.—In the pathogeny of premature expulsion three principal factors are admitted:

The ovum (appendages and fœtus) (pathological state or death).

The uterus (contractions of the uterine muscular structure).

Any foreign body occupying the ovulo-uterine space (hæmorrhages, sounds, etc.).

But whatever the pathogenetic factor that acts primarily, and whatever may be the origin of the accident, it is upon uterine contraction that the principal role devolves, that of the efficient cause. Aside from this single efficient cause there are numerous determining causes that we shall study as follows:

I. Non-traumatic causes.

A. *Father.*

1. *Extra-genital causes.*—Any cause which is capable of producing debility or enfeeblement of the organism may interupt the ulterior development of the ovum. Such are: advanced age, precocious senility, abuse of sexual relations, various diseases (tuberculosis, albuminuria, diabetes, and syphilis especially), various poisons, as lead, tobacco, alcohol and sulphide of carbon.

2. *Genital causes.* — These are essentially local, such as orchitis, prostatitis, urethritis, and strictures.

B. *Mother.*

1. *Extra-genital causes.*—Any cause of organic debility, whatever its source, may act as an interruption to the development of the fœtus.

Heredity.—In some families the women seem more predisposed to abortion than in others. A first abortion exposes to repetition, especially at a corresponding epoch of subsequent pregnancies.

Obesity is a cause of sterility and also of abortion. Very fat animals are bad breeders.

Age.—At the two extremes of genital life the woman seems more often subject to abortion.

Hygiene, alimentation.—A bad hygiene and an insufficient alimentation expose to interruption of pregnancy.

Altitude.—Saucerotte states that women who live in the mountains of the Vosges are more exposed to abortion than those who live on the plains (?).

Medicaments.—Certain drugs, such as ergot, rue, sabina, sulphate of quinine, salicilate of soda, etc., are reputed to have abortifacient properties.

Chronic diseases.—The majority of chronic diseases (tuberculosis, albuminuria, diabetes, cancer) predispose to abortion by debilitation of the organism. Syphilis should be especially mentioned on account of its importance. Poisoning by lead, tobacco, alcohol and sulphide of carbon are also causes.

Acute diseases.—Any acute disease, which acts violently on the organism, either by elevation of temperature or by disordered function, is capable of causing premature expulsion of the ovum. I only recall the principal ones, cholera, typhoid fever, eruptive fevers, intermittent fevers, cardiopaths, incoercible vomiting, etc.

Epidemic abortion.—Among animals, especially among cows, there sometimes exists an epidemic of abortions which attacks all the females of one stable or of one locality. Nocard has shown that this is due to a microbe acting on the genital organs and transmitted from one animal to another. Antisepsis arrests the epidemic. Hervieux has attempted to demonstrate that pregnant females brought in contact with puerperal septicæmia are also predisposed to abortion, but the proof is not positive.

2. *Genital causes.* —These may be periuterine, uterine, or intrauterine.

Periuterine.—Any obstacle to the devolopment of the uterus (abdominal tumors, especially ovarian cysts, adhesions left by a previous pelvic peritonitis) may cause premature expulsion of the ovum.

Uterine.—The same is true of the majority of uterine diseases congestion, metritis and endometritis, deviations, fibroids, cancer). At an epoch corresponding to each menstruation there occurs a congestive impulse, which predisposes to abortion. Any genital excitation may, by inducing congestion or uterine contractions, favor premature expulsion.

Intra-uterine.—We shall take into question here the effusions of blood, which may occur between the ovum and the uterine wall, that is to say, utero-ovuline hæmorrhages. These hæmorrhages, which have their source in the uterus, are, exceptionally, produced at the level of the membranes (utero-membranous hæmorrhages), but almost always in a corresponding zone of the placenta (utero-placental hæmorrhages). According as the blood remains imprisoned in the uterine cavity, or flows out without remaining in the uterus, or as these two conditions are united, the hæmorrhage is called internal (Fig. 412), external (Fig. 413) or mixed (Fig. 414). The result of these hæmorrhages varies according to the abundance and the extent of the placental detatchment, but they usually cause premature expulsion of the ovum.

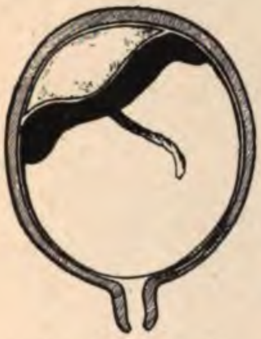


FIG. 412.—Internal hæmorrhage.

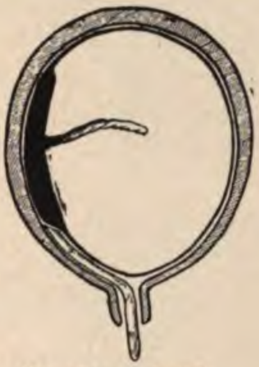


FIG. 413.—External hæmorrhage.

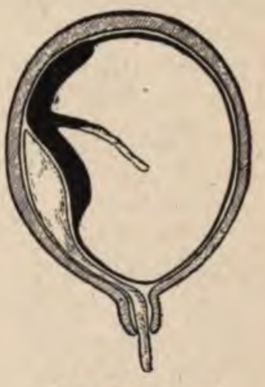


FIG. 414.—Mixed hæmorrhage.

C. *Ovum.*

1. *Appendages.*

Placenta.—Degenerations of the placenta, when they are marked cause the death of the fœtus and abortion. Vicious insertion sometimes terminates in the same result.

Membranes.—Expulsion of the ovum usually follows rupture of the membranes after a brief delay.

Liquor amnii. —Hydramnios, when it is very marked, and especially the acute form, is a possible cause of abortion and of premature accouchement.

2. *Fœtus.*—Any cause that produces the death of the fœtus is also a cause of its premature expulsion. Monstrosities act in the same direction. With regard to multiple pregnancy, it often produces, by excess of uterine distention, expulsion before term, but premature accouchement rather than abortion.

II. Traumatic causes

A. *Mother.*

1. *Extra-uterine causes.* —Any traumatism on a region distant from the genital sphere may be the cause of premature expulsion of

the ovum. I have already spoken of surgical operations and of their influence on the progress of pregnancy.

2. *Genital causes.*—*Periuterine.*—Any traumatism affecting the abdominal wall is capable of causing premature expulsion of the ovum. A prolonged compression of the abdomen may produce the same result.

Uterine.—Any traumatism acting on the cervix, operation, cauterization, digital exploration, vaginal injection with too much force or sexual excess, may be abortive.

Intra-uterine.—Any foreign body penetrating between the uterus and the membranes, accidentally or voluntarily (therapeutically or criminally), causes detachment to a certain extent and usually provokes premature expulsion.

B. *Ovum.*

1. *Appendages.*—The same traumatism which detaches the membranes may rupture them. Its abortive action in such cases is still more certain.

2. *Fœtus.*—The action is the same if the instrument which has perforated the membranes attacks and wounds the fœtus.

Such are the multiple causes and in spite of their number it often happens that the physician finds difficulty in seeking the origin of the premature expulsion.

Pathologicel anatomy and symptomatology.

a. First three months.—*Embryonal abortion* (Fig. 415).—I shall take as a type for description the abortion which occurs at the middle or at the end of the secondmonth reserving some final words for that of the first and third month.

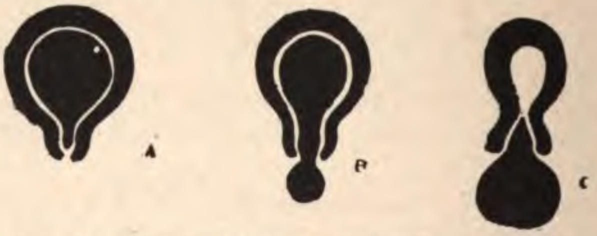


FIG. 415.—Ovum expelled as a whole (no effacement) A B C.

The woman has had a menstrual suppression and has perceived various sympathetic phemomena; she suspects pregnancy. Then follows a genital hæmorrhage, simulating a simple return of the menses, or colic caused by painful uterine contractions. Whatever may be the beginning, pain or flow of blood, these two symptoms are very soon united and continue together. Local examination shows a certain softening of the cervix, and an increase in the size of the body of the uterus accompanied by tension of the contiguous tissues. The external orifice of the cervix is sometimes closed and sometimes open and occupied by the ovum. The ovum is generally expelled as a whole, and in a single stage, into the interior of the vagina. It traverses the cervix by opening successively the isthmus, the cervical canal and the external orifice, but without producing, properly speaking, effacement.

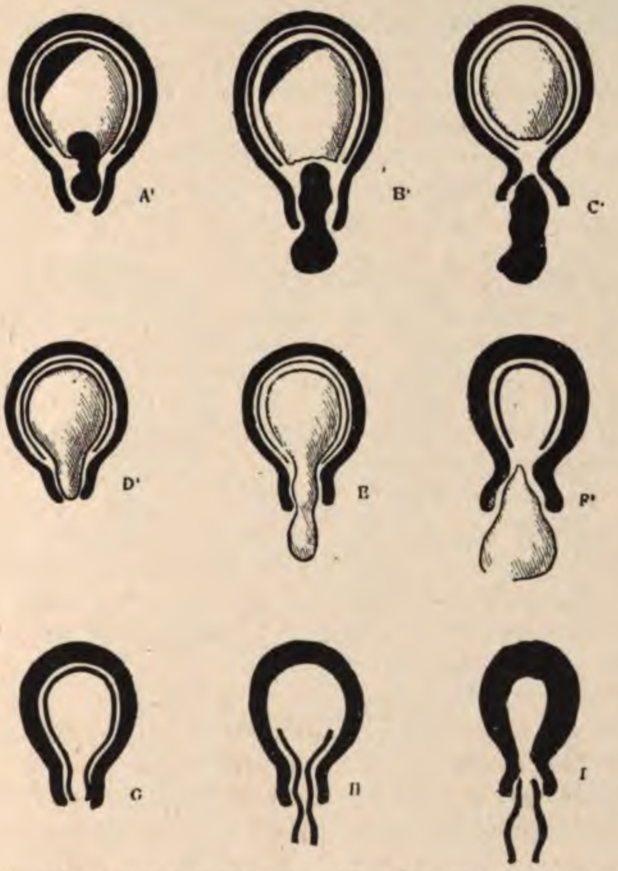


FIG. 418.—Ovum expelled, in three stages (no effacement). A B C, expulsion of the embryo; D E F, expulsion of the appendages less the decidua; G H I, expulsion of the decidua.

After the expulsion of the ovum, the pain subsides and the hæmorrhage diminishes. During some days there is a sero-sanguinolent flow, becoming mucous finally. In three to four weeks the uterus has regained its normal size.

During the first month of pregnancy the condition of gestation is often ignored and abortion occurring at the menstrual period is frequently mistaken for the monthly flow, the ovum being expelled unnoticed.

During the third month the abortion resembles that of the second month with the difference that the ovum being large the pains and hæmorrhages are more marked.

b. Second three months (Fig. 418).—Here I shall also take as a type abortion occurring in the middle of this period, that is to say during the fifth month.

Pregnancy has become quite probable, sometimes even certain, when one of the three following symptoms occur to mark the beginning of the abortion:

A sudden loss of amniotic liquid.

A genital hæmorrhage.

Uterine colic, with its usual characteristics.

Pain and hæmorrhage soon appear, when they have not been the initial phenomena and continue with variable intensity until the accident has terminated or has been avoided. Touch combined with palpation, permits us to detect the characters proper to the gravid uterus and to follow the expulsion of the fœtus, which usually occurs in the following manner:

First stage.—Expulsion of the fœtus.

Second stage.—After a variable time, expulsion of the appendages less the decidua.

Third stage.—Expulsion of the decidua as a whole or in sections.

It sometimes occurs that the decidua is expelled at the same time with the appendages, so that the abortion is completed in two stages. However, expulsion of the ovum in three stages and the non-effacement of the cervix may be considered as the two characteristics of abortion at this period.

The duration of the expulsion is quite variable, it extends from some hours to several days. The pains and the hæmorrhages cease after the complete evacuation of the uterus. A lochial discharge of some days occurs and in three to four weeks the uterus has returned to its normal size.

c. Third three months.—Premature accouchement.—Premature accouchement is an exact copy of accouchement at term, and, like it, occurs in two stages: the first, for the expulsion of the child, and the second for the delivery of the appendages. The puerperal state is the same in both cases and of about the same duration (Fig. 427).

Anomalies of the delivery of the appendages.—Before placental development there may be observed more or less complete retention of the ovuline envelopes which are finally eliminated in sections. When the placenta is distinct various conditions may occur:

1. Sometimes the placenta is completely detached from the

uterine wall and elimination takes place, after a variable time, either as a whole, or by section, with the possible accompaniment of septicæmic accidents.

2. Sometimes the placenta is partly adherent and partly detached; the retention in such cases may be prolonged. The detached part becomes necrotic and is eliminated in fragments, while the adherent part continues to live as a parasite on the uterine wall, becoming the source of obstinate hæmorrhages which necessitate intervention.

3. The placenta sometimes remains totally adherent to the uterus. After a prolonged retention without accidents, the placenta may be expelled as a whole. In place of this, its expulsion in several fragments of variable volume may be observed. Finally, in some exceptional cases, absorption of the retained placenta has been observed.

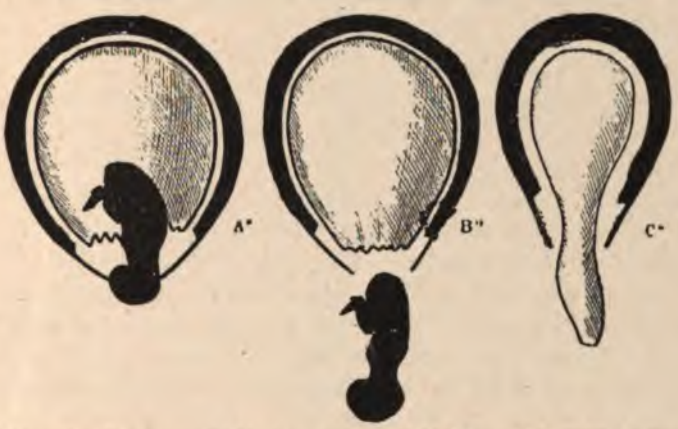


FIG. 427.—Ovum expelled in two stages. A'' B'', expulsion of the fœtus; C'', expulsion of the appendages (effacement).

Complications.—Septicæmia, localized (pelvic peritonitis) or generalized, is frequently observed as a consequence of abortion, especially when there is retention of a part or of the whole of the appendages.

Uterine *hæmorrhage* may precede, accompany or follow the expulsion of the ovum. The loss of blood is sometimes so grave that it causes syncope and even the death of the woman.

Tetanus.—This complication, although very exceptional, has been observed a certain number of times in consequence of abortion.

1. *Premonitory treatment.*—A woman having had a series of pregnancies terminated by premature expulsion, and is again pregnant, what should be done to avoid a repetition of the accident? All supposed causes of premature expulsion must be treated. In the absence of the various known and clearly derminable causes there

are pregnancies in which the interruption seems to be due to irritability or to congestion of the uterus, these two states terminating in exaggerated contractions of the uterine muscle and in premature expulsion of the ovum. Irritability is recognized by the facility with which painful contractions of the organs are produced and will be combatted by absolute repose in bed during a variable time. The use of opiates and of viburnum prunifolium and the absence of sexual relations are also to be recommended. Uterine congestion is to be treated by rest in the horizontal position, by intestinal laxatives and, if the woman is plethoric, by repeated bleedings of 200 to 300 grammes.

2. *Prophylactic treatment.*—If there be a menace of premature expulsion, what treatment should be instituted to prevent abortion? For the execution of this prophylactic treatment absolute repose in bed is necessary. Either viburnum prunifolium or opiates will be administered.

3. *Curative treatment.*

a. Before expulsion.—The indications are for intervention only in case of accident. Hæmorrhage is the principal and the most frequent complication. The best treatment to oppose to this is tamponnement of the vagina. In premature accouchement, the hæmorrhage being almost always due to a placenta prævia, the treatment for that condition is required. Ergot should never be given. During expulsion of the ovum care must be taken to avoid drawing on the part engaged in the cervix, as by this the ovum may be ruptured and a fragment retained that will be difficult to extract. During premature accouchement the management is similar to that of labor at term.

b. After incomplete expulsion.—If the case be one of premature accouchement, the management will be the same as in retention of the placenta in delivery at term. But if the pregnancy be less advanced at the time of expulsion, and if there be a retention of the placenta, or, before its formation, of ovuline membranes, what should be the line of conduct? In the absence of accidents (septicæmia or hæmorrhage) expectation with rigorous antisepsis is clearly indicated, for, in the great majority of cases, the expulsion of the membranes or of the placenta takes place spontaneously after some hours or some days. But if accidents follow, the danger becomes pressing and it becomes necessary to interfere. Here the obstetricians are divided into two camps, the evacuators and the anti-evacuators of the uterus.

The evacuators, in cases of hæmorrhage or of septicæmia, after having dilated the cervical canal if necessary, draw the cervix down with the vulsellum and remove the placenta and the membranes retained in the uterus, by the aid of the fingers, or the ovum forceps (Fig. 431), or by the curette. The intervention is terminated by intra-uterine irrigation and by intra-uterine tamponnement, if necessary.

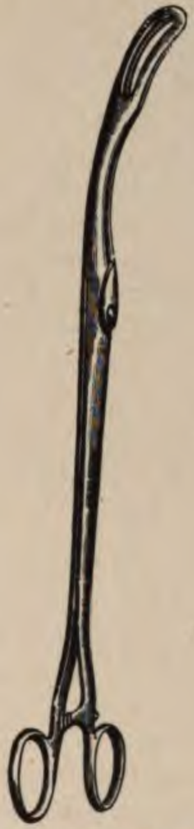


FIG. 431.—Ovum forceps.

The anti-evacuator, dismayed by an intervention which they consider useless and dangerous, combat the hæmorrhage by vaginal tamponnement and the septicæmia by frequent vaginal injections.

Both these methods have their advantages and their disadvantages, but in spite of the good results given by the latter procedure it offers less security.

c. When the uterus is completely evacuated, regression occurs in a normal manner, except in case of complications analogous to those following after accouchement at term and which will be treated by similar methods. The woman should remain in bed the same length of time as after delivery at term.

CHAPTER XXV.

ACCIDENTS OF ACCOUCHEMENT.

Ruptures and lacerations of the perinæum, of the vagina, and of the uterus have already been discussed and we have here only to consider hæmorrhages, procidence of fœtal members and of the cord, subcutaneous emphysema and fractures.

Hæmorrhages.—Genital hæmorrhages that occur during accouchement may proceed from the vulva, from the vagina, from the cervix, or from the body of the uterus. They are traumatic or spontaneous.

a. Vulvar hæmorrhages.—Traumatic causes: Any accidental or operative traumatism may produce a hæmorrhage of variable importance, but usually slight unless a varicose vein has been opened.

Spontaneous causes: Rupture of a varix may give rise to abundant hæmorrhage.

Treatment: Compression, forcipressure, sutures.

b. Vaginal hæmorrhages.—The causes are analogous to those producing vulvar hæmorrhage. These hæmorrhages are quite exceptional before the expulsion of the fœtus and after accouchement. They often make a part of those of delivery of the appendages, which will be studied later.

c. Cervico-uterine hæmorrhages.—At the beginning of labor, and especially among the primiparæ, the opening of the cervix produces a slight hæmorrhage from the excoriations of the mucosa. Truly serious hæmorrhages result from lacerations produced by the passage of the fœtus.

d. Hæmorrhages from the body of the uterus almost always depend upon a vicious insertion of the placenta. A placenta normally inserted may sometimes furnish a certain quantity of blood by its detachment. But these hæmorrhages are in general of too small importance to require special treatment.

Procidence of fœtal members and of the cord.

a. Procidence of the cord.—The cord is said to be prolapsed when it is insinuated between the fœtal part which presents and the wall of the genital canal.

Frequency, one out of one hundred accouchements.

Pathogeny and ætiology.—In the normal state, the part of the fœtus which presents exactly obstructs the genital canal, impedes the flow of the liquor amnii and the procidence of the cord. But if any cause obstructs this eutocic adaptation the liquor amnii and the cord obeying gravity and the uterine contractions are drawn toward the vagina and prolapse of the cord is thus constituted. The different causes capable of producing this result are the following:

1. *Ovum.*
    - *a. Fœtus.*
        1. Small volume.
        2. Presentation other than the vertex.
        3. Multiple pregnancy.
        4. Previous procidence of a member.
    - *b. Appendages.*
        1. Hydramnios.
        2. Placenta prævia.
        3. Exaggerated length of the cord.
        4. Knots of the cord (?).
        5. Premature rupture of the membranes.
2. *Mother.*
    - *a. Uterus.*
        1. Absence of tonicity of the inferior segment.
    - *b. Pelvis.*
        1. Pelvic deformities, or any cause preventing engagement of the fœtal part.
3. *Obstetrician.*
    1. Any intervention improperly performed is capable of causing procidence of the cord.

Symptoms and diagnosis.—Two cases may present, one where the membranes are intact, the other where the bag of waters has broken.

a. Intra-ovuline procidence.—Membranes intact.—When the cervix is not open, the cord is difficult to perceive with the finger through the uterine wall, but with a living child (pulsations of the cord) and very thin cervico-uterine segment, an experienced finger can sometimes recognize the presence of the cord. In proportion as the cervix opens, the diagnosis becomes more and more easy, for the membranes oppose only a slight obstacle to digital exploration.

b. Membranes ruptured.—Extra-ovuline procidence.—First degree, intra-uterine. The loop of the cord does not pass the external orifice. Second degree, intra-vaginal. The loop of the cord lies in the vagina, without opening the vulvar orifice. Third degree, intra-vulvar. The funicular loop projects through the vulva. Besides the fœtal part that presents the exploring finger meets the cord which is recognized by its form and its consistency and, in cases where the child is living, by the pulsations that are felt by pressing it between the finger and a resisting plane.

Prognosis.—Any arrest of the funicular circulation is the cause of prompt death of the fœtus, which succumbs to asphyxia. Thus the procidence which exposes to compression is very dangerous for the fœtus; however, Depaul's estimation of seventy-five per one hundred of mortality appears somewhat exaggerated.

The prognosis also depends:

Upon the degree of the prolapse—the more pronounced it becomes, the more the fœtus is exposed;

Upon the presentation—the danger of compression being greater in vertex presentations;

Upon the epoch of labor—the more advanced the labor, the easier intervention becomes;

Upon the state of the membranes—with an intact bag of waters, it is rare to see procidence of the cord become fatal to the child;

Upon the intervention.

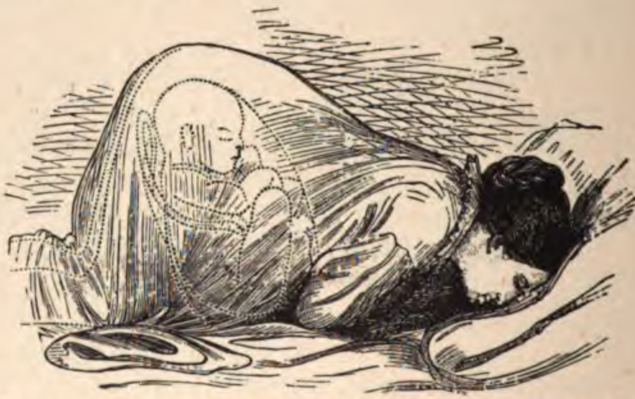


FIG. 432.—Reduction of the cord by the genu-pectoral position (Playfair).

Treatment.—*a. Three methods of intervention.*

1. *Reduction of the cord.*—By the position of the woman. The woman being placed in the genu-pectoral position (Fig. 432), the action of gravity is sometimes sufficient to reduce the cord.

By the use of the hand. The cord being seized by the extremities of the fingers (Fig. 433) is returned to the uterus and, at need, hooked over a limb to avoid a new prolapse. For this purpose Mauriceau applies a sponge in the space through which the cord descends.

By the use of an instrument (Figs. 434 to 438). In one case I used a simple long forceps to grasp the cord and to return it to the uterine cavity (Fig. 439).

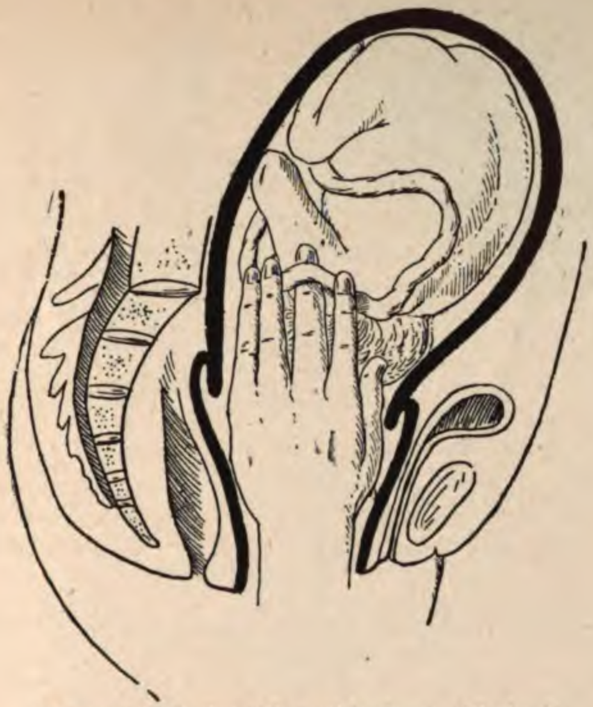


FIG. 433.—Reduction of the cord by the use of the hand.

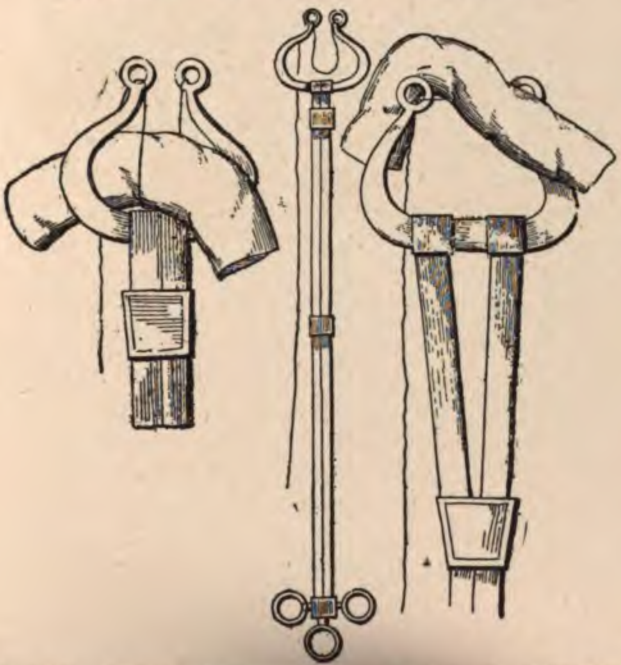


FIG. 434.—Lyre-shaped instrument for [illegible] the cord and liberating it after [illegible]

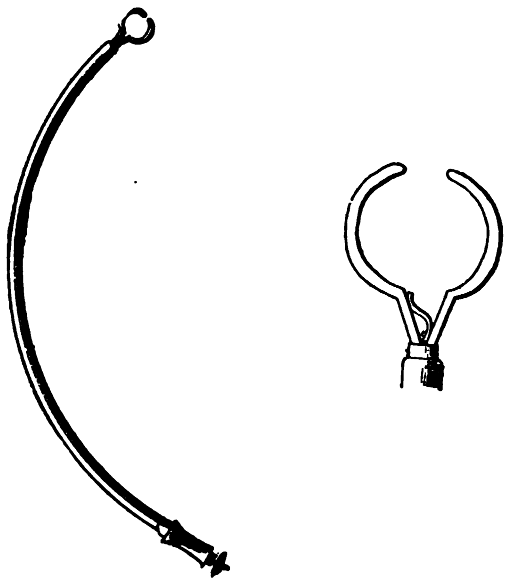


FIG. 435.—Double hook with mobile branches, permitting the cord to be seized and abandoned after reduction.

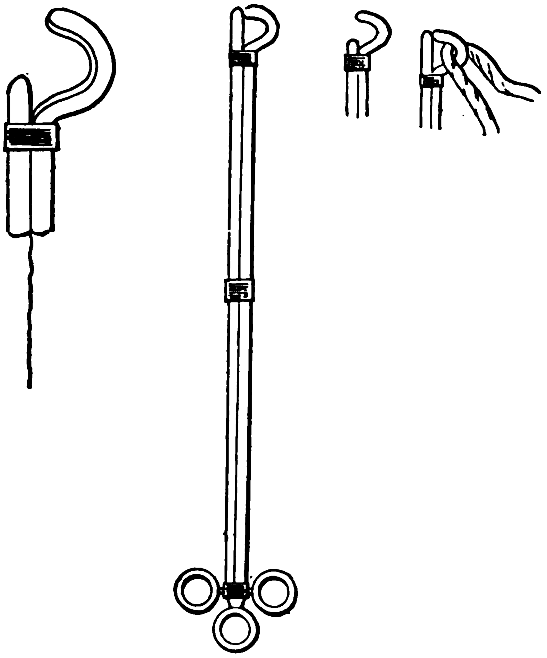


FIG. 436.—Grasping hook of whalebone, composed of two handles with parallel movement.

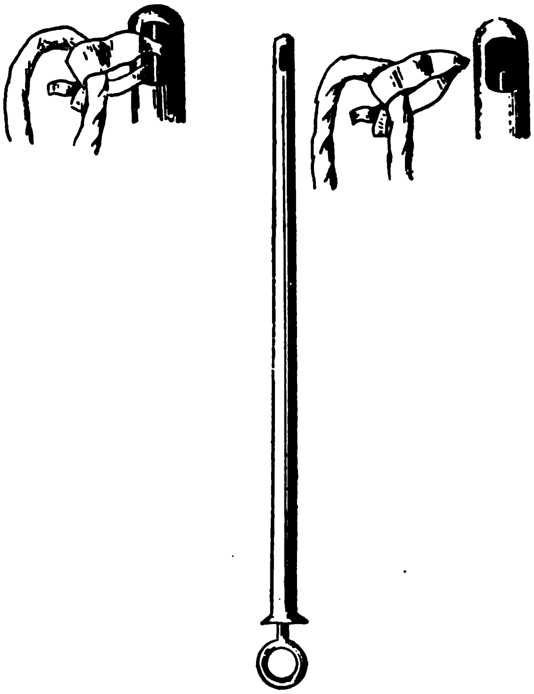
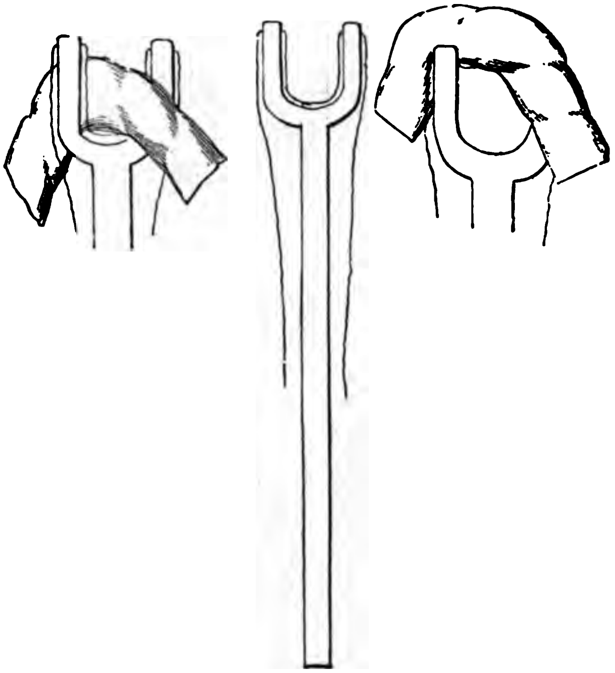


FIG. 437.—Ordinary sound with stylet.



F[illegible] metal or wood made on the spot, if necessary.

2. *Podalic version* has been advised; either by mixed or by external manœuvres before complete dilatation, hoping that this will reduce the prolapse, or in case of not reduction that the prognosis will become less grave with a presentation of the breech; or by internal manœuvres, when dilatation is complete, to terminate accouchement.

3. *Forceps.*—The application of this instrument with complete dilatation is also advised.

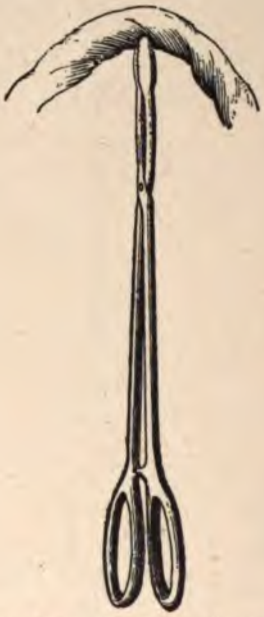


FIG. 439.—Simple long forceps.

b. Clinical use of these different methods.—If the cormic ovoid presents (breech, thorax, abdomen), the management during the period of dilatation will be the same as if the funicular procidence did not exist, for attempts at reduction are almost useless, as the cord again prolapses and besides the danger is relatively small. After complete dilatation, in breech presentation, the pulsations must be watched and extraction made if danger occurs.

If there be a presentation cf the cephalic ovoid two cases may exist:

If the dilatation is complete, the accouchement must be promptly terminated by version or by the forceps.

If the dilatation is incomplete, reduction of the cord should be attempted by the use of the methods already described. If these procedures fail, and if the fœtus is in danger, pelvic version, by external or by mixed manœuvres, should be essayed, with or without anæsthesia. Finally, as soon as dilatation becomes sufficient, the child must be delivered promptly.

c. *Procidence of fœtal membranes* (Fig. 440).—Frequency, one per one hundred. The causes and the pathogeny are the same as those given for prolapse of the cord. There exist three degrees in the procidence of the fœtal members.

First degree—hand, foot.
Second degree—forearm, leg.
Third degree—arm, thigh.

The third degree is very rare and can only exist as a consequence of tractions exerted by the accoucheur.

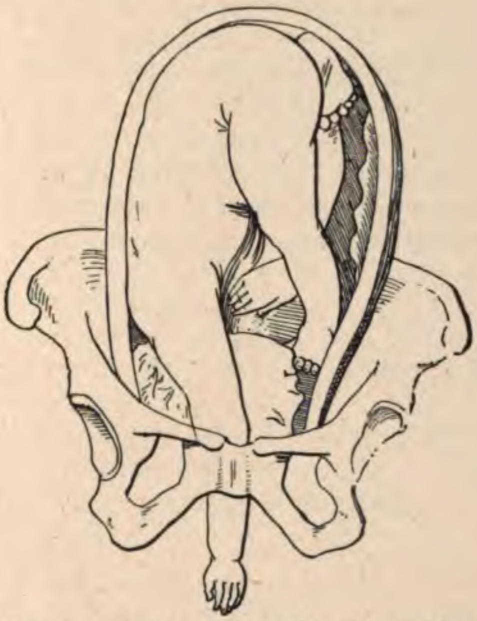


FIG. 440.—Procidence of the left superior member.

Treatment.—

Membranes intact.—Simple expectation.

Membranes ruptured.—When the dilatation is sufficient to permit access, attempt may be made to push up the prolapsed member with the extremities of the fingers. If reduction is impossible, complete dilatation is awaited and if expulsion is still prevented recourse is had, according to the case, to version or to the forceps. In vertex presentation, the forceps will be slipped between the head and the prolapsed member and extraction performed as if the procidence did not exist.

Subcutaneous emphysema and fractures.

Under the influence of the excessive exertions made by the woman during the period of expulsion there have been noted, as pathological curiosities, fractures of the sternum and subcutaneous emphysema. Usually the emphysema is not grave, but it may however, cause the death of the patient.

Retention of fœtal head. Following the extraction of the fœtus in breech presentation, the fœtal head held by the retraction of the uterine neck or by contraction of the bony pelvis may be retained in the uterine cavity after rupture of the neck, and if not immediately extracted by the forceps or by embryotomy, its retention may cause septicæmic poisoning and death. Nevertheless the toleration of the uterus in this respect is sometimes remarkable, as in the case reported by Loisnel, where the head of the fœtus remained a hundred and twelve days after accouchement without causing septicæmia; extracted at this time the woman made a good recovery. In such cases it is necessary to dilate the neck of the uterus by means of tents or dilators, and, as soon as the dilatation is sufficient, remove the head with the forceps or to perform embryotomy.

CHAPTER XXVI.

ACCIDENTS OF THE DELIVERY OF THE APPENDAGES.

The accidents which may complicate the delivery of the appendages are usually divided into general and local.

The general accidents relate to those affections which attack the organism in general at this period, such as, convulsions, syncope, asphyxia, etc. The only indication for their treatment is to terminate delivery as promptly as possible.

Aside from these general accidents, which we cannot study here in detail, there are numerous local complications that become of first importance in obstetrics.

These local accidents that occur at the moment of delivery of the appendages may be grouped as follows:

I. Retention of the appendages of the ovum.
II. Hæmorrhages.
III. Treatment.

I. Retention of the appendages of the ovum.

Divisions, definitions.—Retention may be:

1. Total: that is, of all the appendages.

2. Partial: of a part of the placenta; of the membranes as a whole; of a part of the membranes.

Retention of the membranes seems at first difficult to define. When, ten or twelve hours after accouchement, the placenta and the membranes are still in the uterus the diagnosis is not difficult to establish, but when, after the expulsion of the fœtus, their delivery delays, we find it difficult to state precisely the exact moment at which the physiological state gives place to the pathological state, that is, to retention.

This difficulty, however, does not apply to the isolat m of the membranes, which exists whenever, after the expulsion of the placenta, part of the whole of their extent remains in the uterus, but only relates to retention of the placenta.

Now it may be said that there is a retention of the placenta whenever the internal orifice (uterine circle, or an orifice accidentally formed in the uterus) is sufficiently closed and rigid to prevent the passage of the placenta or that of the hand that seeks to extract it. It is then the internal orifice, or an accidental orifice, which affords the measure of retention of the placenta.

But to what degree must this orifice be closed to cause retention? A mathematical answer is impossible. The orifice must return on itself to a degree sufficient to constitute an obstacle to the passage of the placenta, or to the hand of the accoucheur. It is then the placenta (or better, the hand, since it requires a larger opening) which gives the measure, the criterion. I recognize that this lacks precision, but we must be content with it for want of a better standard (Figs. 441, 442, 443).

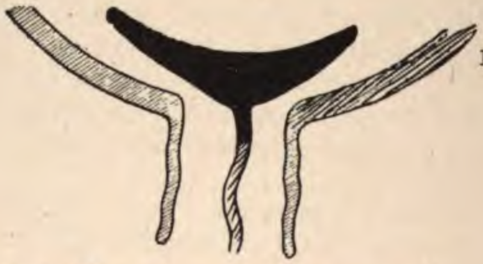


FIG. 441.—No retention.

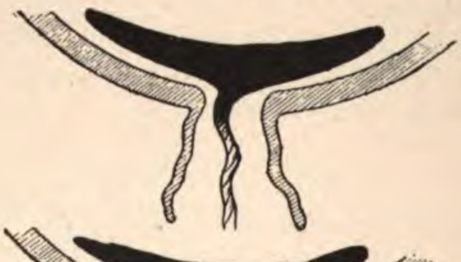


FIG. 442.—Limit.

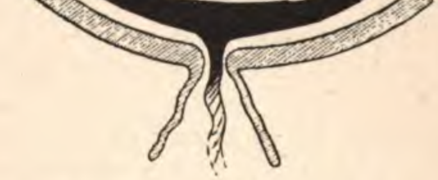


FIG. 443.—Retention.

Symptoms and diagnosis.—

1. *Total retention of the appendages.*—This total retention will be recognized, when, in digital examination, a certain time after accouchement, one finds the internal orifice, or uterine circle, into which passes the cord (unless it has been separated), sufficiently

closed and rigid to prevent the passage of the placenta and of the hand, if it is necessary to introduce it.

Closed and rigid are the two indispensable conditions of retention, for with a closed but supple orifice retention does not exist, dilatation being possible without difficulty under the influence of a mechanical dilatation (traction on the placenta, or the introduction of the hand).

2. *Partial retention of the appendages.*—The diagnosis will be made by the examination of the appendages expelled and of the woman.

a. Retention of the placenta.—Total retention of the placenta is not observed without simultaneous retention of the membranes. We have then to note only partial retention of the placenta, of a detached cotyledon, or of an accessory cotyledon. By examination of the appendages it will be perceived that a part of the placental substance is wanting when on the uterine surface there is a depressed, ragged region. However, with a placenta that has been torn during extraction the diagnosis may be difficult. The retention of an accessory cotyledon is recognized by the existence of two vessels running in the same direction on the membranes and suddenly interrupted at the place of rupture of the ovuline envelopes. In case of doubt, the introduction of the hand into the uterus and the exploration of the cavity permits us to discover and to secure the retained cotyledon, which is generally adherent.

b. Retention of the membranes.—The isolated retention of the membranes is easily discovered by examination of the expelled appendages, when it is complete or extended; but in cases where it is only constituted by a simple fragment the diagnosis will sometimes be doubtful. This retention will be suspected when in attempting to reconstruct the membranes in the position that they occupy in the uterus this cannot be completely arrived at. In examination of the patient the fingers will seek a floating membrane, the presence of which will leave no doubt as to the diagnosis. Retention may also exist without the membranes being accessible, when, for example, they are completely enclosed in the uterus.

Progress and complications.—Retention of the membranes produces no immediate accident, but may be, during post-partum, the cause of hæmorrhages, of septicæmia, or of after-pains.

Partial or total retention of the placenta sometimes becomes the source of the same accidents, but with a much greater degree of frequency and of gravity. In the absence of complications this retention may last a variable time, from several hours to several days. The placenta is then expelled by a new labor, as a whole, or in successive fragments.

Prognosis.—The prognosis of isolated retention of the membranes is generally benign, on condition that a rigorous antisepsis shall observed during post-partum. Spontaneous expulsion is the rule. That of placental retention is more serious for the patient is exposed to septicæmia and sometimes to grave hæmorrhage. Thus we shall see, apropos of the treatment, that it is necessary to interfere in retention of the placenta, while expectation is the best method for that of the membranes.

Ætiology.—

1. *Uterine inertia,* consecutive to accouchement, prevents the detachment of the placenta and its expulsion. Uterine inertia is especially a cause of dangerous hæmorrhage and will be studied at greater length with this accident.

2. *Uterine spasm.*—Spasm of the external orifice has been wrongly admitted; that of the internal orifice (uterine circle), or of an orifice of new formation, placed above the preceeding, has alone been proven.

(a). *Spasm of the internal orifice.*—When the placenta is completely above the internal orifice we designate the condition as encystment, when it is more or less engaged in this orifice, incarceration.

1. Encystment may exist:

With a total spasm of the uterus (Fig. 444).
With a spasm of the internal orifice alone (Fig. 445).
With an irregular spasm of the body of the uterus (Fig. 446).

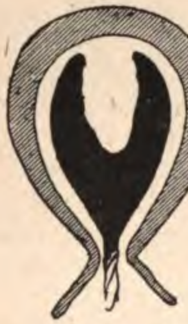


FIG. 444.—Total spasm.

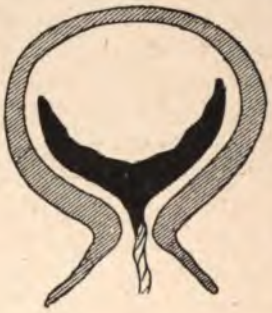


FIG. 445.—Spasm of the internal orifice.

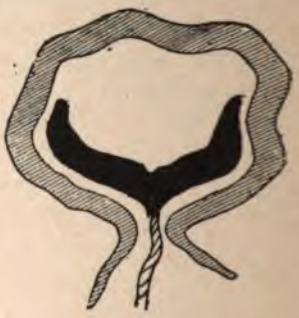


Fig. 446.—Irregular spasm.

2. Incarceration may be:

Pronounced (Fig. 447).
Median (Fig. 448).
Slight (Fig. 449).

(b). *Spasm of an orifice of neoformation.*—In the interior of the uterus, above the internal orifice or uterine circle, there is formed, either by paralysis of the uterus at the placental formation, or by contraction of an annular and limited region of the uterine muscle, a narrowed portion dividing the cavity of the body of the uterus into two cells, the superior containing the placenta (Figs. 450 and 450 *bis*). This form of retention may present the same varieties of encystment and of incarceration as imprisonment, that is:

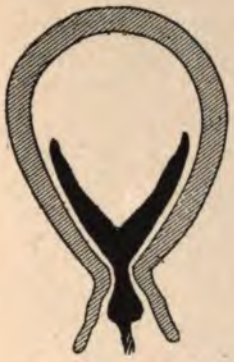


FIG. 447.—Pronounced incarceration.

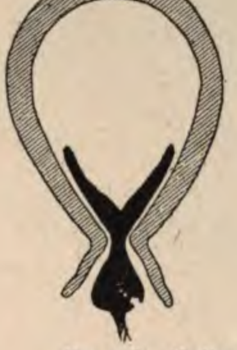


FIG. 448.—Median incarceration.

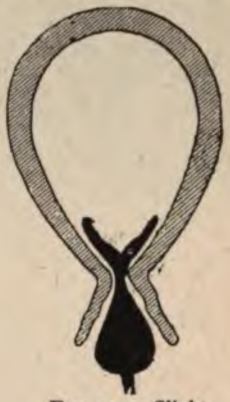


FIG. 449.—Slight incarceration.

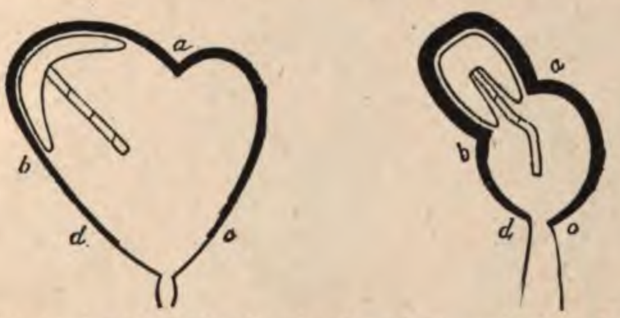


FIG. 450 and 450 *bis*.—*a b*, orifice of neoformation (spur of bifid uterus); *c d*, internal post-partum orifice (uterine circle).

1. Encystment may exist:

With total spasm of the body (Fig. 451).
With spasm of the neo-orifice (Fig. 452).
With irregular spasm (Fig. 453).

2. Incarceration may be:

Pronounced (Fig. 454).
Median (Fig. 455).
Slight (Fig. 456).

3. *Uterine rupture*, with or without passage of the placenta into the peritonæal cavity is a cause of retention.

4. *Uterine malformation.*—Bifidity, obstructing the retraction after accouchement, may favor the retention of the placenta and of the membranes.

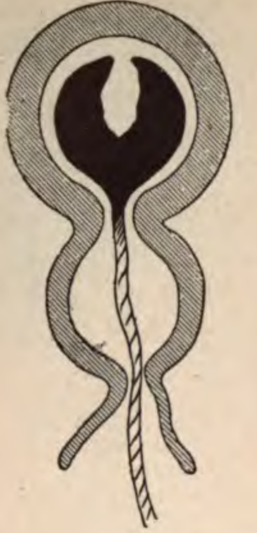


FIG. 451.—Total spasm.

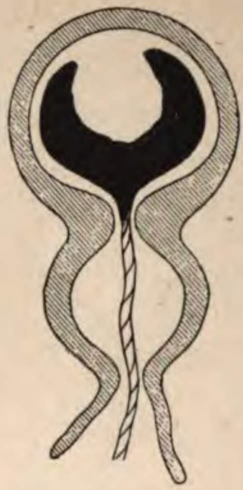


FIG. 452.—Spasm of the neo-orifice.

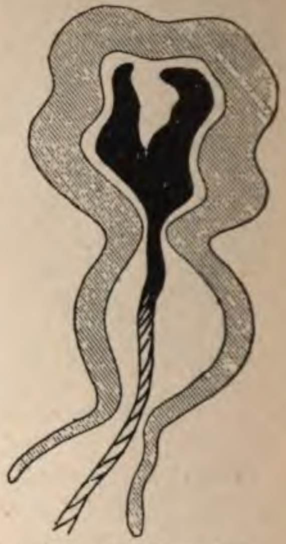


FIG. 453.—Irregular spasm.

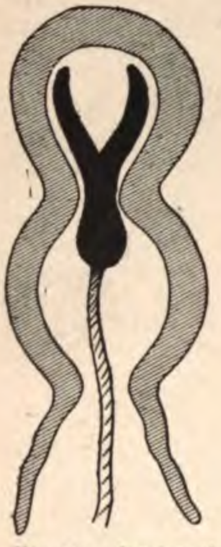


FIG. 454.—Incarceration pronounced.

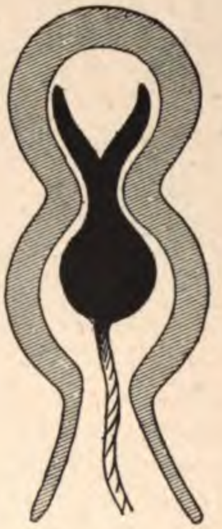


FIG. 455.—Incarceration median.

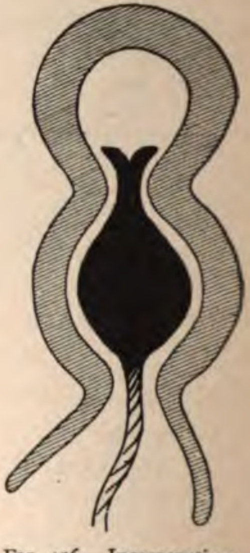


FIG. 456.—Incarceration slight.

5. *Uterine tumors.*—Any tumor, for example, a fibrous polypus, by obstructing the passage of the placenta, is capable of preventing the expulsion of the appendages (Fig. 457).

6. *Tumors of the vulva and vagina.*—The same obstacle may sometimes be caused by a tumor of the vagina or vulva.

7. *Excess of the volume of the placenta.*—This excess of volume may be due to the size of the placenta itself, to the addition of clots

adhering to its uterine surface, or to the super-distention caused by the blood contained in the organ itself. The larger the placenta, it will be understood, the greater becomes the difficulty in passing the uterine circle.

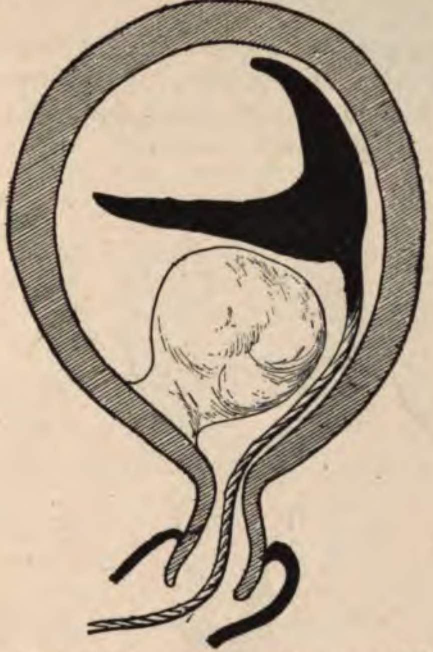


FIG. 457.—Uterine fibroma, obstructing the passage of the placenta.

8. *Adhesions of the placenta.*

Varieties:

- *a.* Extent.
  - Partial adhesion.
  - Total adhesion.
- *b.* Degree: three.

Simple exaggeration of the physiological and normal state that the uterus is capable of overcoming, in most cases, by contracting with energy.

More intimate adhesions, and such that only the introduction of the hand into the uterus can separate, the connections uniting the placenta to the uterine wall.

Veritable fusion.—It is impossible to detach the placenta with the hand, and in post-mortem it becomes necessary to use the knife to separate it from the uterus, so intimate is the fusion.

Ætiology.—

Utero-placental inflammation.—Leading to a vertible sclerosis that unites the placenta to the uterus by fibrous tissue.

Utero-placental hæmorrhage.—The clot which forms between the placenta and the uterus unites these organs by its transformation.

Exaggeration of the physiological adhesion.—The supposition is advanced, without explaining its mechanism, that the marked adhesion which exists at the fifth to the sixth month has persisted to term.

9. *Accessory placenta.*—The existence of an accessory placenta, still adherent or detached (Fig. 458), is a cause of retention. The cotyledon, thus isolated, remains in the uterus with a more or less considerable section of the membranes.

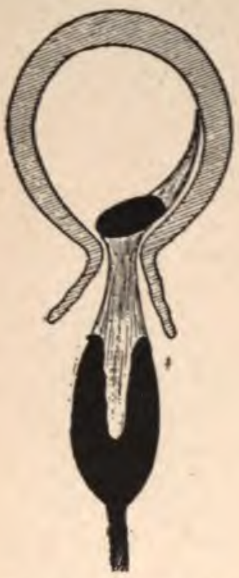


FIG. 458.—Retention of an accessory cotyledon.

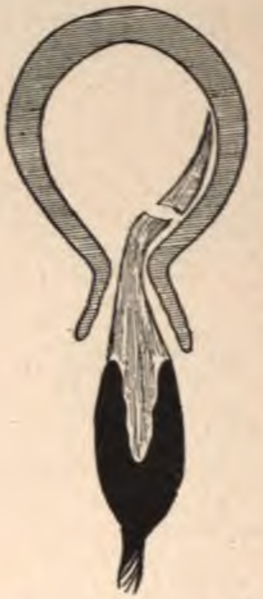


FIG. 459.—Partial retention of the membranes of adhesions.

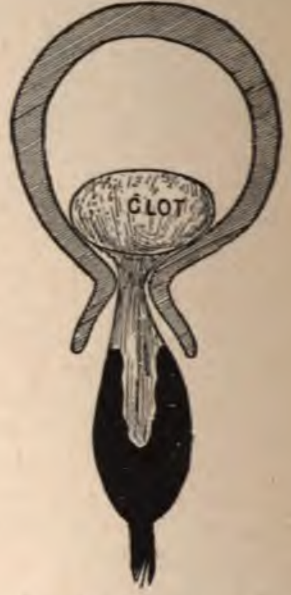


FIG. 460.—Retention of the membranes by a clot.

10. *Multiple pregnancy.*—In multiple pregnancy the placenta, by its size or by the existence of two lobes, predisposes to retention. With this last disposition, the two placental masses being separated, the last to be expelled acts in relation to the first like an accessory placenta.

11. *Adhesion of the membranes.*—The adhesion of the membranes may be of variable extent. Sometimes the decidua alone is adherent, sometimes the decidua and the chorion, finally the three membranes may be united. The causes are inflammation of the membranes, hæmorrhage of pregnancy, and, with regard to the decidua, the persistence of physiological adhesion. These adhesions cause the retention of a more or less considerable section of the membranes (Fig. 459).

12. *Clot.*—A blood clot enclosed in the membranes is sometimes retained at the internal orifice and prevents the exit of the ovuline envelopes (Fig. 460).

13. *Untimely traction on the membranes.*—Too strong tractions on the membranes during their exit may cause their rupture and favor retention.

14. *Fragility of the cord.*—A too fragile cord breaks under traction and, by impeding ulterior tractions, thus facilitates retention.

15. *Vicious insertion of the cord.*—The insertion of the cord at the edge of the placenta, or on the membranes, exposes to funicular rupture at that point and to the danger of retention.

16. *Shortness of the cord* may cause its rupture and the same conditions as above.

17. *Accouchement in the upright position,* by causing rupture of the cord at the moment of expulsion of the child, exposes in the same way to ulterior retention of the appendages.

18. *Untimely tractions* on the cord sometimes terminates in rupture and the unfortunate results that we have seen above.

II. Hæmorrhages of delivery of the appendages.

Definitions and divisions.—In the same way that continuance of the appendages in the uterus for a certain time after accouchement is the rule, so the flow of a certain quantity of blood at the moment of delivery of the appendages is also normal and physiological. But when does this hæmorrhage cease to be physiological and when does it become pathological? In the same way that it is impossible to answer mathematically as to retention, so it is useless to try to give in grammes the quantity of blood which should be lost to constitute a pathological state. The best definition is the following: A hæmorrhage of delivery of the appendages becomes pathological when it compromises the woman's health.

This hæmorrhage, whether it precedes, accompanies or follows the expulsion of the appendages, may be internal, external, or mixed. These divisions have a practical importance, for they show the gravity of the hæmorrhage should not be judged solely by the quantity of blood which escapes from the vulva.

Ætiology.—1. *Uterine inertia.*—The detachment of the placenta leaves the vascular uterine surface bare and all the vascular orifices gaping. If the uterine muscular structure does not contract at this moment, to energetically close all the vessels, a hæmorrhage of a severity in proportion to the degree of the uterine inertia will be the consequence.

2. *Lacerations and ruptures of the uterus.*—Any solution of continuity affecting the cervix or the body of the uterus may cause hæmorrhages of variable gravity. Rupture of the uterus may be combined with inertia.

3. *Uterine inversion*, of which we may have three degrees, intra-uterine (Fig. 461), intra-vaginal (Fig. 462) and extra-vulvar (Fig. 463), produces a persistent hæmorrhage, which may become grave by its abundance or by its duration.

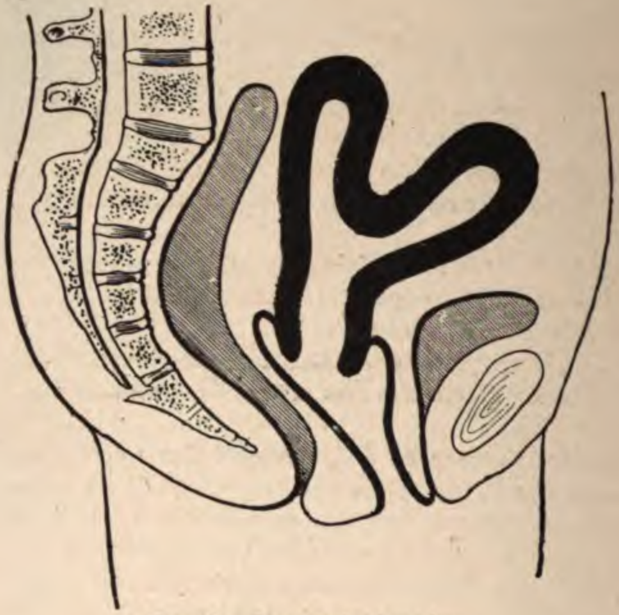


FIG. 461.—Intra uterine inversion.

4. *Lacerations of the vulva and of the vagina*, by affecting important vessels, may be the cause of a more or less serious hæmorrhage.

5. *Vicious insertions of the placenta* expose to hæmorrhages during delivery of the appendages, for, after detachment of this organ, the inferior segment, where it was inserted, returns on itself less easily than the superior, on account of its relative poverty of muscular fibres.

6. *Retention of the appendages.*—Every retention, partial or total, of the appendages, may become the source of hæmorrhage by obstructing the retraction of the uterus.

III. Treatment of the accidents of delivery of the appendages.

1. *The retention exists alone.*—The retention may be total or partial.

a. Total retention.—When an hour after accouchement delivery of the appendages is not yet accomplished, we are authorized to make digital examination to ascertain the state of the parts and of the internal orifice. There are two elements that must be noted before any intervention:

The state of the internal orifice (recognized by touch).

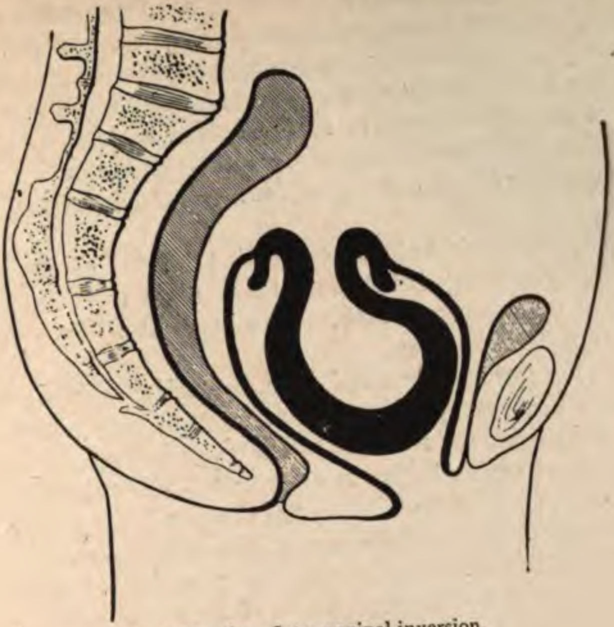


FIG. 462.—Intra-vaginal inversion.

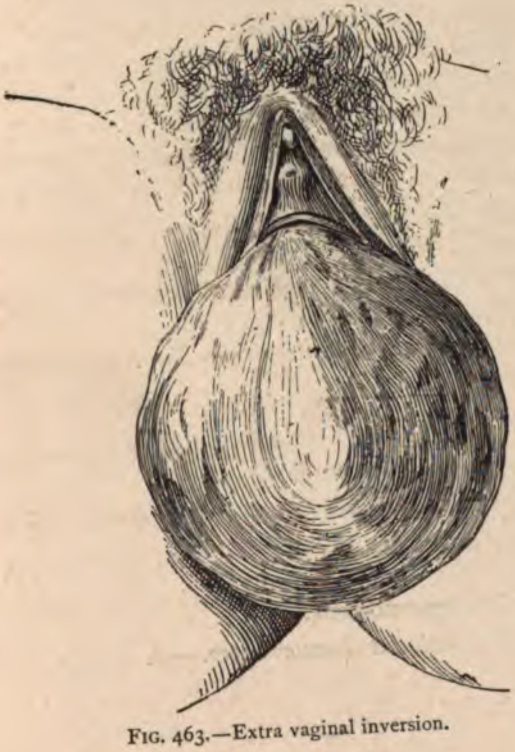


FIG. 463.—Extra vaginal inversion.

The situation of the placenta (determined by touch, and presumed from the distance of the funicular ligature from the vulva).

1. If the placenta is at the level of the internal orifice, whatever may be the permeability of this opening, the indications are to express, to draw, and to wait; at the end of a variable time the placenta detaches, then it becomes accessible to the finger, engages in the cervical canal and will be expelled. Success is only a question of patience.

2. If the placenta is not accessible at the level of the internal orifice, it may be concluded that the detachment is not yet terminated. The management, then, varies according to the permeability of the internal orifice.

When this orifice is supple and open, the indications are to wait, at the same time essaying uterine massage or expression, and, if after a certain time, the result is nul, to act as in the following case.

If the internal orifice begins to close and if it is seen that longer waiting will prevent the introduction of the hand it becomes necessary to proceed to artificial delivery of the appendages.

b. Partial retention.—There may be retention of a placental fragment, of an accessory cotyledon or of the membranes. Whenever the retention of a placental fragment or cotyledon is recognized the hand should be introduced into the uterus to effect its removal. If the cervix presents an impassible barrier, the indications are to wait and to watch the woman attentively, proceeding to curette the uterine cavity as soon as a fetid flow or septicæmic symptoms present. If only a section of the membranes is retained, simple expectation is preferable to intervention. But if there is complete retention of the membranes immediate intervention is preferable.

2. *The hæmorrhage exists alone* (delivery of the appendages having been completed).

To avoid repetition and discussion at length this subject may be presented in resume as follows:

a. Hæmorrhages of medium intensity.—Three successive conditions to be determined:

Uterine inertia;
Vulvar wound;
Vaginal or cervical wound; } Causes of hæmorrhage.

Three therapeutic measures (outside of ligatures and sutures):

Hot antiseptic injections, 50° C.;

Ergot;

Utero-vaginal tamponnement.

b. Grave and fulminant hæmorrhages.—A single condition is possible:

Uterine inertia.

Three therapeutic measures:

Compression and massage of the uterus through the abdominal wall.

Introduction of a hand into the uterus.

Utero-vaginal tamponnement.

The gravity of the hæmorrhages following delivery of the appendages has aroused obstetricians to the creation of a series of measures which I consider inferior to those given above. I simply mention them, but advise that the three already described should have the preference. Among these procedures are, intra-uterine injection of the perchloride of iron, introduction into the uterus of a dilatable rubber bag, electricity, introduction of ice into the uterus, intra-uterine injections of alcohol, iodine or vinegar, and compression of the aorta through the abdominal wall or by the hand introduced into the uterus.

3. *The retention and the hæmorrhage exist together.*—The hæmorrhage will only cease with the expulsion of the appendages; to deliver the appendages is, then, the first indication. If the internal orifice is still open, artificial delivery will be easy, and, besides, permeability of the internal orifice is the rule, for the uterine inertia, the cause of the hæmorrhage, allows gaping of the cervix.

If the internal orifice is closed and does not allow the passage of the hand, a rubber bag will be introduced, which, by its dilatation, acts both by opening the cervix and as a plug to arrest hæmorrhage. At the same time one hand exercises pressure on the uterus through the abdominal wall. At the end of one to two hours the dilatation will be sufficient to admit the hand and intra-uterine intervention will become possible.

CHAPTER XXVII.

ACCIDENTS OF POST-PARTUM.

1. *Hæmorrhages.* — Post-partum actually commences at the moment when delivery of the appendages terminates, yet a hæmorrhage, which occurs a half-hour, an hour, or even more, after expulsion of the appendages, is still considered as a hæmorrhage of delivery, responding to the same causes and to the same treatment as those of this period of the puerperal state. Among the hæmorrhages of post-partum we only rank those which occur twelve hours after delivery. This is certainly an arbitrary limit, but it responds quite well to the necessities of description. These hæmorrhages are also designated as secondary, in distinction from those occurring during delivery of the appendages, which are primary. The post-partum lasts three months. We shall then study here the hæmorrhages occurring during this period consecutive to the birth of the child.

These hæmorrhages are of a variable abundance. They are sometimes slight, almost physiological, sometimes copious and capable of endangering the life of the patient. They may be external or mixed, but the quantity of blood contained in the uterus can never be considerable as the organ at this time has returned upon itself.

Ætiology.—a. Traumatic causes.—

1. Exploratory traumatism, caused by the introduction of a sound into the uterus.

2. Accidental reopening of a wound of the perinæum, of the vagina, or of the uterus.

3. Too early resumption of sexual relations.

4. Getting up too soon after delivery.

b. Spontaneous causes:

1. Secondary inertia may be the cause of a hæmorrnage even as late as two or three days after delivery.

2. Total and partial retention of the appendages. When an abundant hæmorrhage occurs without apparent cause some days after accouchement, the possibility of this cause should always be remembered.

3. Uterine deviation (especially retrodeviation) may also cause an obstinate hæmorrhage.

4. Uterine inversion, unrecognized at the moment of delivery or produced later may also produce a persistent and abundant hæmorrhage.

5. Ulceration.—Fibroma, cancer.

6. Metritis.—Subinvolution.—Arrest of the normal involution, the frequent cause of metritis, produces repeated hæmorrhages of slight abundance.

7. Lactation.—At the moment when the child first takes the breast a slight hæmorrhage is often noted, which is repeated at each nursing for some time. The explanation is found in the uterine contraction provoked by the irritation of the nipple.

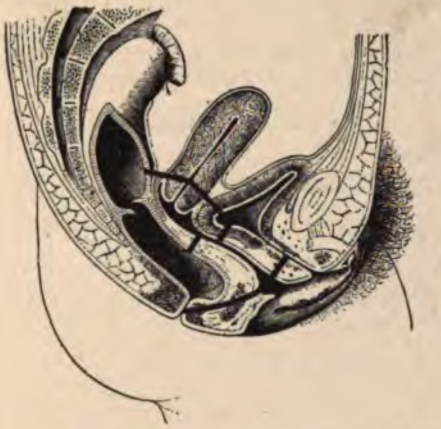


FIG. 464.—Different varieties of genital fistulæ.

The *prognosis* of these hæmorrhages is in general benign, exceptionally they become grave and demand an energetic treatment.

The treatment will vary essentially according to the cause and the abundance of the flow.

A slight hæmorrhage usually ceases under the influence of repose, of hot vaginal injections, of the action of ergot or of digitalis. If there exist uterine deviation, metritis, or an inversion, the treatment appropriate to these various causes will be applied.

A hæmorrhage of medium intensity will generally be subdued by the same treatment.

An abundant hæmorrhage will be due, at the beginning of post-partum, to a secondary inertia and will require the same treatment as for inertia of delivery of the appendages. Later, it will be due to the existence of a fibroid or to the retention of placental debris. Such cases will require vaginal tamponnement with iodoform gauze or curetting of the uterus, followed by intra-uterine tamponnement.

2. *Fistulæ.*—In consequence of a prolonged accouchement, when the fœtal head remains in contact with the same point of the parturient canal for a prolonged period, or after a particularly difficult labor that has caused grave traumatisms, more or less extended necroses of the uterus, of the vagina or of the contiguous organs are seen. The eschars are cast off six to ten days after accouchement, establishing communications between the genital organs and the urinary passages or the intestine that are termed fistulæ (Fig. 464). These fistulæ may also be produced during accouchement by perforation caused by instruments.

CHAPTER XXVIII.

THE VECTIS OR THE LEVER.

The vectis was probably devised by Chamberlan at the same time as the forceps. It is composed of a handle terminated by a fenestrated spoon (Fig. 465), recalling exactly a blade of the straight forceps.

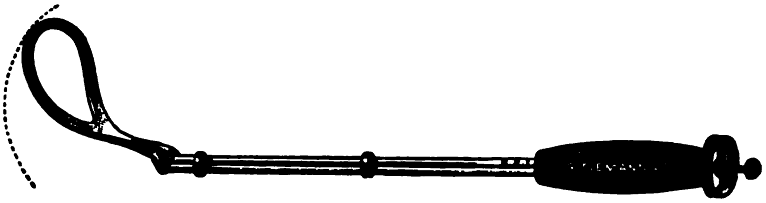


FIG. 465.—Ryerson's adjustable vectis.

This instrument is passed into the genital canal and adapted to the occiput or to one of the parietal bones of the fœtus. The handle is then grasped with both hands and given a lever movement, by which the fœtal part is pushed toward the center of the parturient canal.

Applied on the occiput, the lever produces flexion of the head; on one of the parietal bones, lateral inclination, by depressing the protuberance on which it acts.

At present, the lever has been abandoned by all obstetricians as the forceps have the preference. It has the disadvantage of being only a correcting instrument (flexing the head or inclining it laterally) and of not admitting traction as with the forceps.

In the presence of this abandonment it is useless to insist at length on the action of this instrument. However, it may be again in favor some day, for if it has, in relation to the forceps, the disadvantage of not permitting a prompt termination of the accouchement, it is capable of producing certain effects (flexion, lateral inclination) that the present forceps do not realize and that are valuable in a brow presentation, for example, or in a narrow pelvis. But these are new points for future study and illumination.

CHAPTER XXIX.

VERSIONS.

Version is an operation which has for its end a modification of the situation of the fœtus in the uterus, in such a way as to change the presentation or to create one when it does not already exist. This modification in the fœtal situation may be obtained in three ways:

By external manœuvres, external version.
By internal manœuvres, internal version.
By mixed manœuvres, mixed version.

Independently of the manœuvres executed, version is called:

Cephalic, when the head is brought to the superior strait;
Pelvic or podalic, when the breech is brought down to determine the position.

I. External version.

Three stages are the same for each variety of version:

1. To grasp the fœtus.
2. Fœtal evolution.
3. Fœtal fixation.

1. *Grasping the fœtus* (Fig. 466).—After determining the exact situation of the fœtus, a hand is applied on each of the poles of the child, so as to grasp it firmly. When the two extremities are thus held, it can be given the desired movement.

2. *Fœtal evolution* (Fig. 467).—The two poles being grasped as indicated, the hands exert a soft and progressive pressure in contrary directions, so that the breech may be directed toward the fundus of the uterus and the head brought to the superior strait by the shortest road. However, if difficulties are found in causing the

cephalic extremity to descend in one direction, the opposite course may be taken in the direction of least resistance. During their displacement the hands glide on the skin, which may be smeared with vaseline, if necessary.

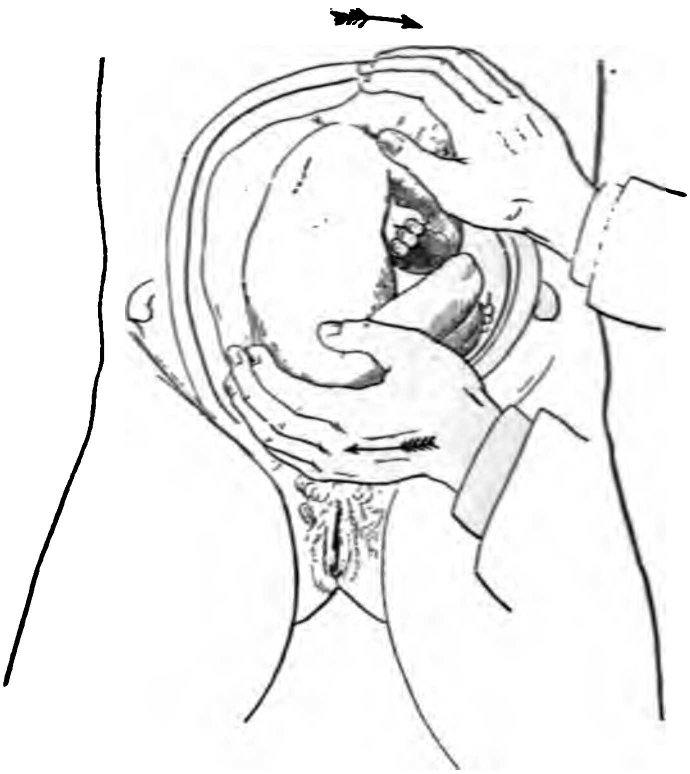


FIG. 466.—First stage. Grasping the fœtus.

3. *Fœtal fixation.*—When the head has been brought to the superior strait, it is necessary to fix it in this new position, to avoid return of the vicious presentation. For this purpose I use a belt furnished with four distinct cushions (Fig. 468). These pads, which can be inflated separately, permit it to act directly on the breech and on the head; they constitute four boundaries fixing the extremities laterally and maintaining the child in the desired position.

II. Mixed version.

a. Podalic version.

1. *Grasping the fœtus* (Fig. 470).—The abdominal hand grasps and depresses the breech while the vaginal hand pushes up the head of the child; from this double action results fœtal evolution. The accoucheur being placed on the right side of the woman applies the

left hand on the breech which is grasped as in external version, while one or several fingers of the right hand are introduced into the vagina to seek the fœtal part.

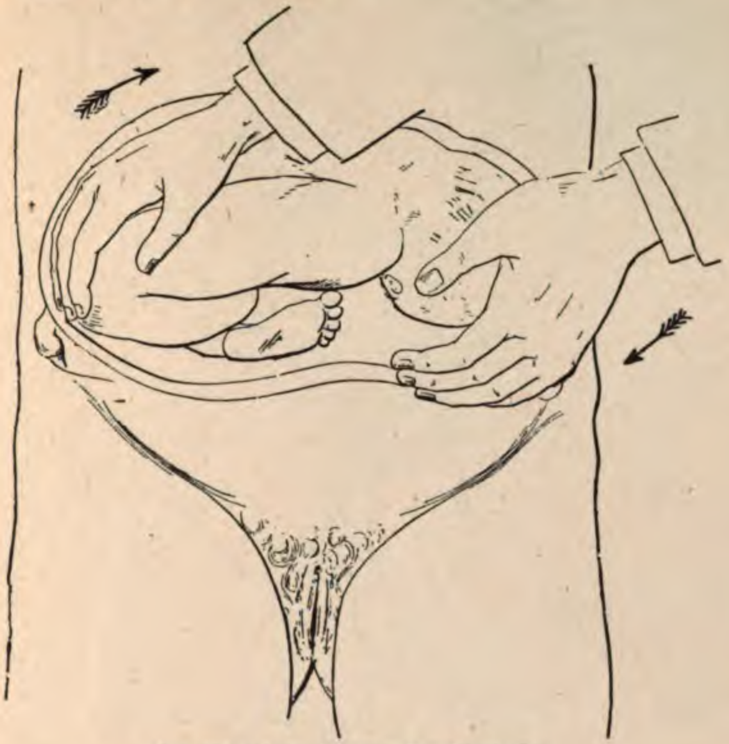


FIG. 467.—Second stage. Fœtal evolution.

1. *Fœtal evolution* (Fig. 471).—The abdominal hand depresses the breech, while the vaginal hand pushes up the different fœtal parts as they successively present at the uterine orifice. The fœtal evolution should be made as much as possible on its anterior or sternal plane, for in this way the pelvic members arrive at the uterine opening more easily, where their seizure abridges the operation.

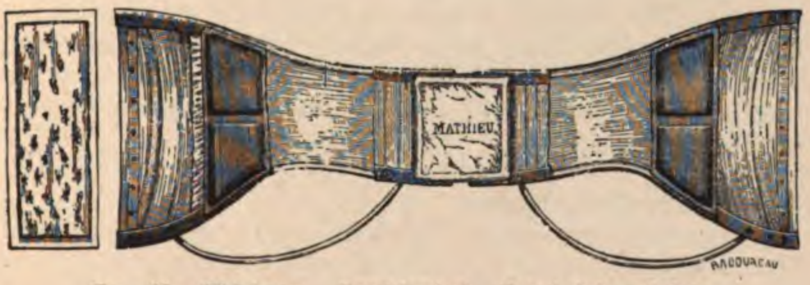


FIG. 468.—(Third stage. Fœtal fixation). Entocie belt, with four lateral dilatable cushions.

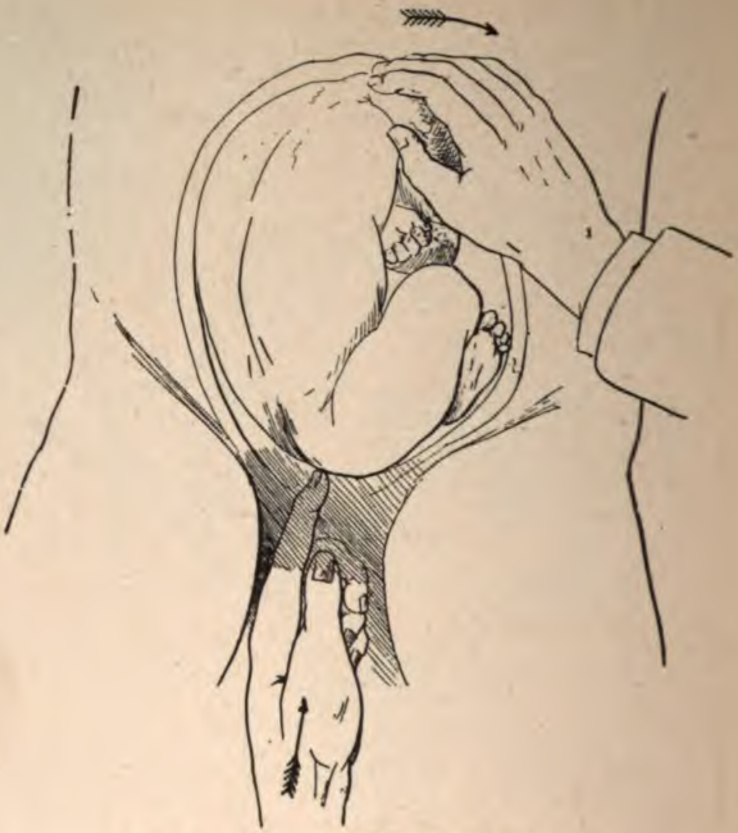


FIG. 469.—Mobilization of the engaged fœtal part.

3. *Fœtal fixation* (Fig. 472).—As soon as one of the small pelvic members becomes accessible, it is grasped through the uterine orifice by one or two fingers and brought down into the vaginal cavity.

b. Cephalic version (Fig. 473).—The hands are placed in a similar manner. The evolution is made in the opposite direction to that of podalic version, that is, by depressing the head and pushing up the breech first, and then the different fœtal parts successively, as they become accessible. Fixation is made, as in cephalic version, by external manœuvres.

III. Internal version.

1. *Seizure of one or more fœtal parts.*—The aim will be to grasp one or both feet of the child and bring them to the vulva. This comprehends a series of secondary questions which will be touched upon successively as follows:

The hand to be introduced;

The mode of introducing the hand;

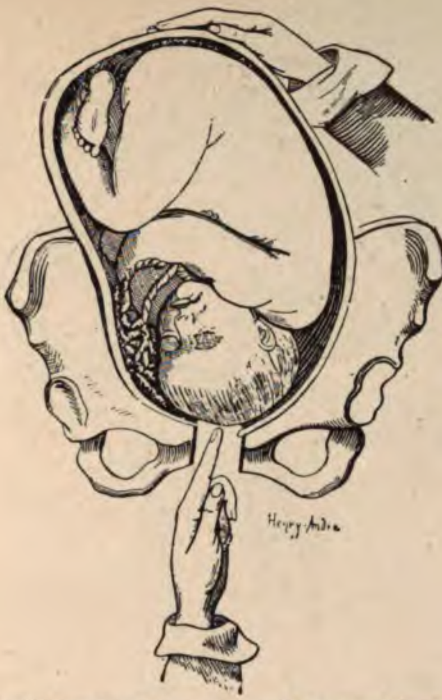


FIG. 470.—External podalic version. First stage (Braxton Hicks).

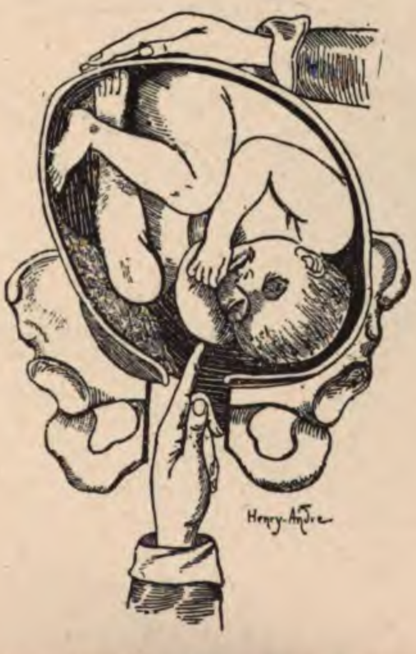


FIG. 471.—External podalic version. Second stage (Braxton Hicks).

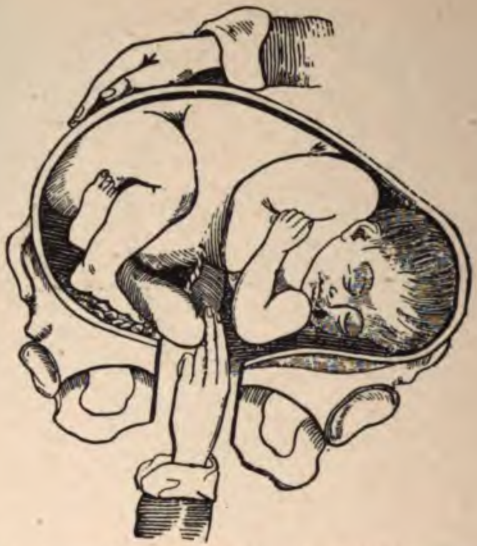


FIG. 472.—External podalic version. Third stage (Braxton Hicks).

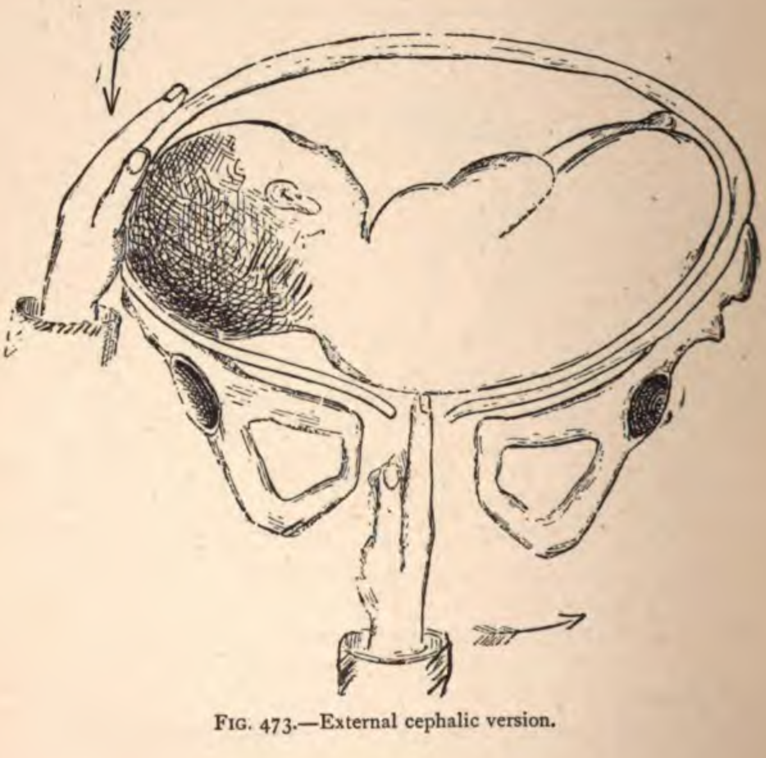


FIG. 473.—External cephalic version.

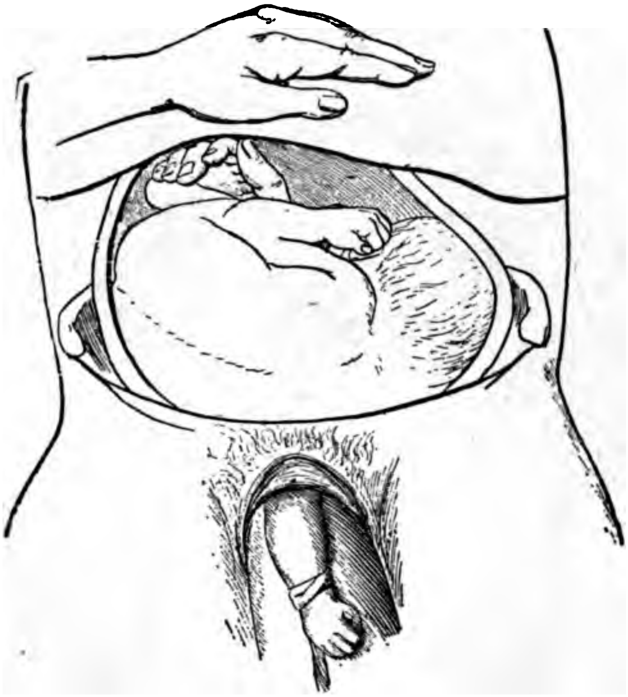


FIG. 474.—Internal podalic version. Grasping the feet in thorax presentation (dorso-anterior).

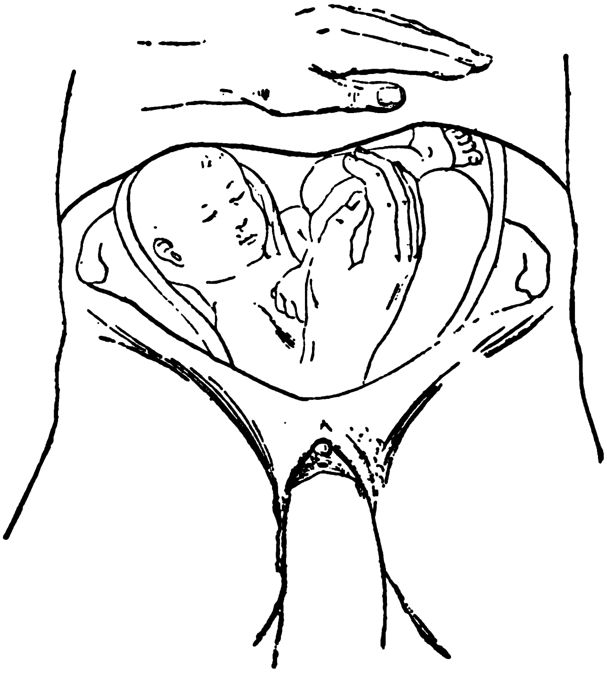


FIG. 475.—Internal podalic version. Grasping the feet in thorax presentation (dorso-posterior).

The search for the feet;
The seizure of the feet.

The hand to be introduced.—I always introduce the right hand first, and if, by hazard, I fail to grasp the feet, it is withdrawn and the left replaces it. I prefer, in the exceptional cases in which it becomes necessary, to preform this double manœuvre, which is without inconvenience to the anæsthetized woman, rather than to torture the memory with a series of principles for the most part useless.

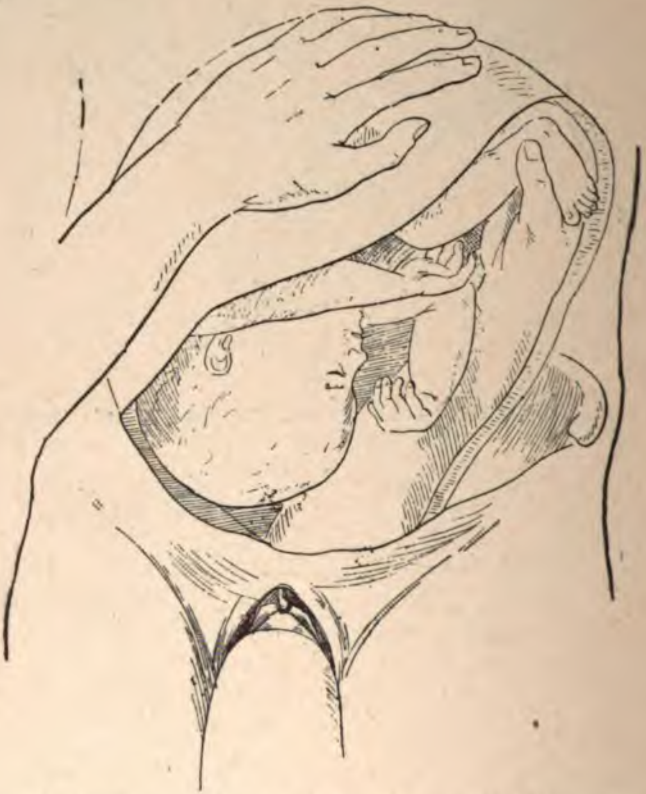


FIG. 476.—Internal podalic version. Grasping the feet in vertex presentation.

The mode of introducing the hand.—The hand, smeared with vaseline over all its dorsal region, takes the form of a cone. With this configuration favorable to penetration, the hand is passed through the vagina to the cervix. The cervix should be sufficiently dilated to allow the hand to pass (a requisite condition for internal version); complete dilatation is only indispensable for extraction. Arrived at the cervix the hand meets the bag of waters when it is yet intact; this must be ruptured before penetrating into the uterus.

The search for the feet.—What direction should the hand follow to arrive most easily at the feet of the child? The pelvic members being, save very rare exceptions, flexed and folded along the anterior plane of the fœtus, it is by following this sterno-umbilical plane that they are most easily found (Figs. 474, 475, 476, 477).

The seizure of the feet.—If the two feet are easily found, they are grasped and drawn down to cause evolution of the fœtus; but in case only one foot can be found, it is useless to delay to seek a second, for the single foot is perfectly sufficient to execute version.

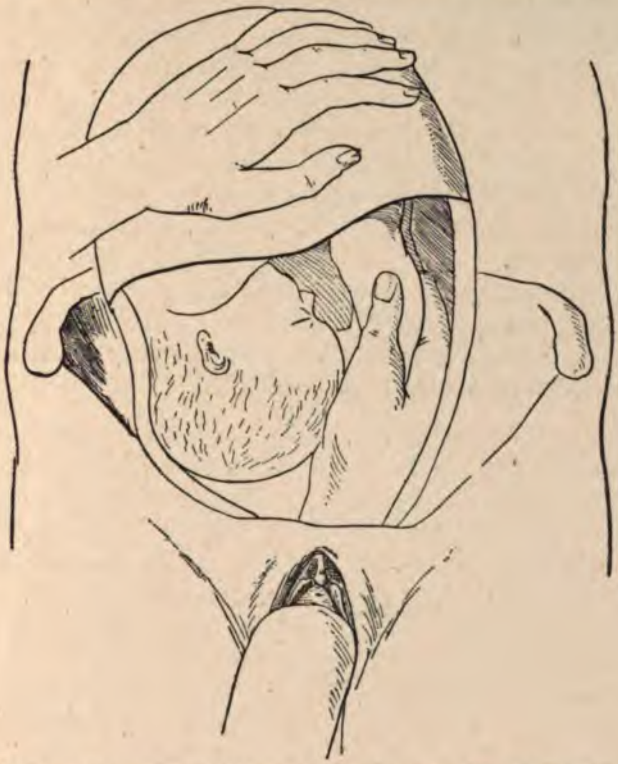


FIG. 477.—Internal podalic version. Second stage. Fœtal evolution.

2. *Fœtal evolution.*—For evolution it is necessary to exert traction on the foot or feet grasped, to draw the parts outward. At first there will be felt a certain resistance, then if evolution is possible the foot or feet descend, drawing down the breech, and thus producing evolution.

The tractions for evolution as well as the progression of the hand, in the first stage, should only proceed during the intervals of the uterine contractions.

The hand, which during the first stage was placed on the fundus of the uterus to maintain it, should aid evolution, either by supporting the breech or by pushing the head toward the fundus of the uterus.

3. *Fœtal fixation.*—This third stage is without importance here,

for, if the dilatation is complete, version is generally terminated by extraction; if not, it is sufficient to leave the foot or feet in the vagina or at the vulva.

Prognosis.—The prognosis of the different versions, for the mother and for the child, depends upon:

The operator;

The variety of the version employed;

The circumstance proper to each particular case.

The operator should be experienced and aseptic.

In a general manner the gravity of each variety of version becomes less as there is less penetration into the genital organs. Internal version is the most serious and external the most benign.

With regard to the different circumstances which may cause variations in the prognosis, they are too numerous to mention. Complications and difficulties may arise that will produce a very grave prognosis.

However, we may say that when properly performed and executed at the correct moment, these different versions usually permit us to save the mother and the child, and that they constitute one of the most valuable resources of obstetrics.

CHAPTER XXX.

FORCEPS.

The forceps is a sort of pincers with separable blades used to grasp the fœtus and extract it from the genital canal. There are many varieties of forceps, but we may separate them into three classes.

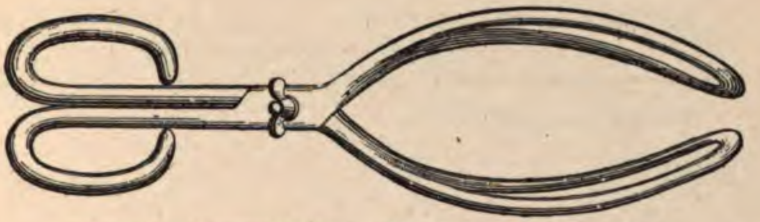


FIG. 480.—Unicurved forceps. XVIIth century (Chamberlan).

1. *The unicurved forceps.*—The first forceps, devised by Chamberlan (Fig. 480), possessed a single curve, the cephalic curve, and was thus a unicurved forceps. Like all the instruments of the present day it is composed of two branches, each divided into a handle, a blade, and an intermediate part, or articulation. The two halves of the instruments are called the right and left blades, and also the male and female blades; the left branch, or male blade, bearing the pivot of the articulation. These denominations should be remembered as they will be constantly met in the descriptions which follow.

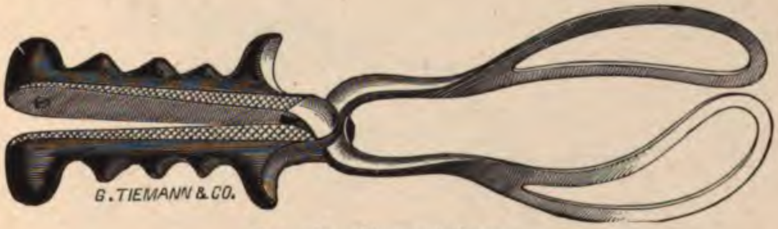


FIG. 481.—Simpson's forceps.

2. *The bicurved forceps.*—The priority of this modification belongs to Levret (Fig. 482), who, in 1747, published a description of a forceps with two curves, one cephalic, the other pelvic, seen on examining the instrument in detail. The various bicurved forceps of the present day are designed, like those of Levret, with one curve, adapted to the head, the other to the pelvis.

3. *The tricurved forceps.*—The most complete forceps of this class was that produced by Tarnier, in 1877. In a general way it resembles that of Levret, but differs in three principal points (Figs. 483 and 484):

1. By the presence of a pressure screw, placed at the side of the articulation, to supplement the action of the hands in keeping the handles together;

2. By the addition of two movable rods, destined to transmit the traction;

3. By a traction handle fitted to the preceeding, and designing the perinæal curve.

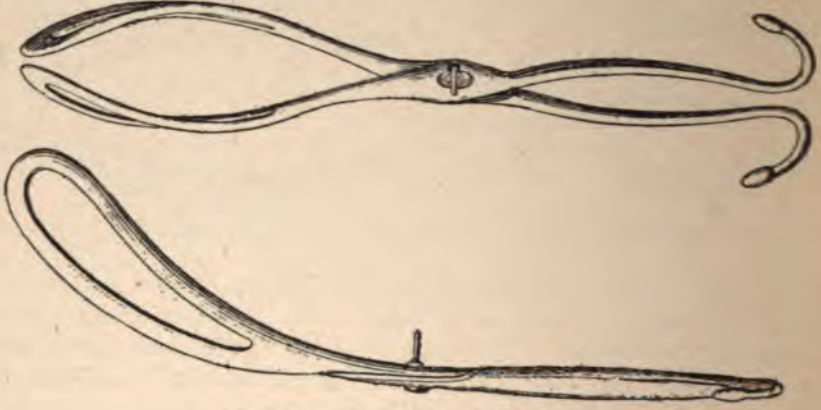


FIG. 482.—Bicurved forceps (Levret).

From this disposition, the tricurved forceps presents the following advantages:

1. It permits traction in the axis of the genital canal.

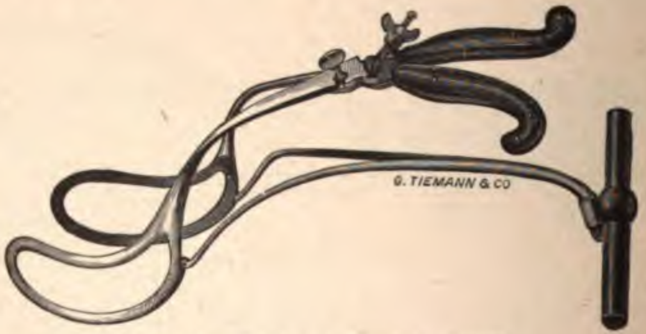


FIG. 483.—Tarnier's axis-traction forceps.

2. It allows the head its mobility, since the tractions are made by an apparatus articulating with the blades which are thus left to themselves, after fixation with the pressure screw.

3. It possesses an indicating needle, constituted by the handles, which, by showing the movements of the still invisible head, is valuable in pointing out the direction in which the tractions should be exercised.

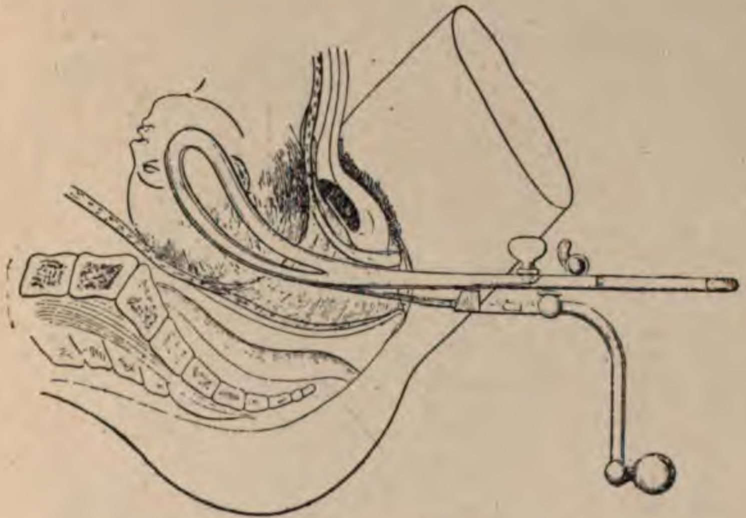


FIG. 484.—Tricurved forceps.

The different types of forceps, so far studied, are those with crossed branches, but there is also another variety with parallel branches. Like the first variety we have described, forceps with parallel branches may be divided into three principal types: the unicurved (Fig. 485), the bicurved (Fig. 486) and the tricurved (Fig. 487). For mechanical reasons forceps with parallel branches do not exert as great a compression on the fœtal part between the blades as the crossed forceps, yet their employment is not common at present, and I leave them out of consideration, together with a series of various models, which only realize ingenious ideas.

Application of the forceps.

It is indispensable to divide this study into two parts:

a. The general application of the forceps.

b. The particular applications.

a. General application.—There are three successive stages:

1. Introduction.
2. Articulation.
3. Extraction.

FIRST STAGE.—There are three rules relating to the introduction of the forceps, the first concerning the mother, the second the child, and the third the forceps.

1. Maternal rule.

Right branch, grasped with the right hand, introduced to the right of the woman.

Left branch, grasped with the left hand, introduced to left of the woman.

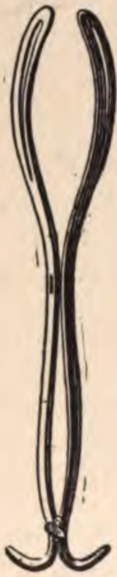


FIG. 485.
Porallel unicurved forceps (Thenance, 1781).

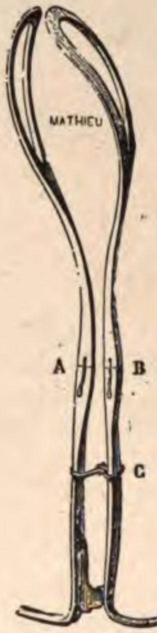


FIG. 486.
Parallel bicurved forceps (Valette, 1857).

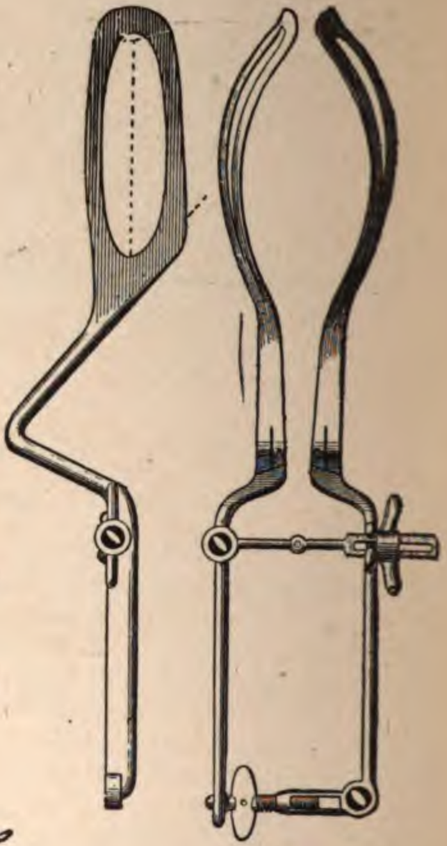


FIG. 487.
Parallel tricurved forceps (Poullet).

2. Fœtal rule.

The child should be grasped from one ear to the other. If there is a presentation of the cephalic ovoid the diameter grasped should be:

The biparietal for the vertex;
The bimalar for the face;
The bitemporal for the brow.

In cases of breech presentation the bitrochanteric diameter will be chosen.

3. Instrumental rule.

The left branch is always to be applied first, thus avoiding crossing the handles in articulating.

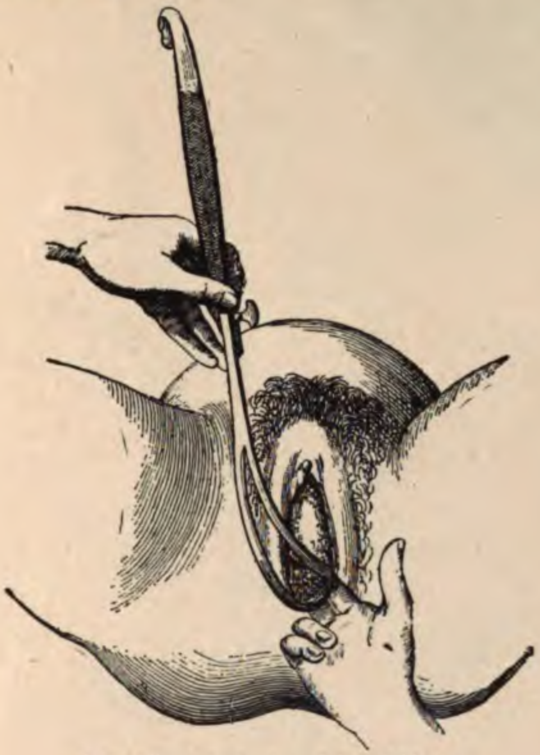


FIG. 488.—Introduction of the left blade.

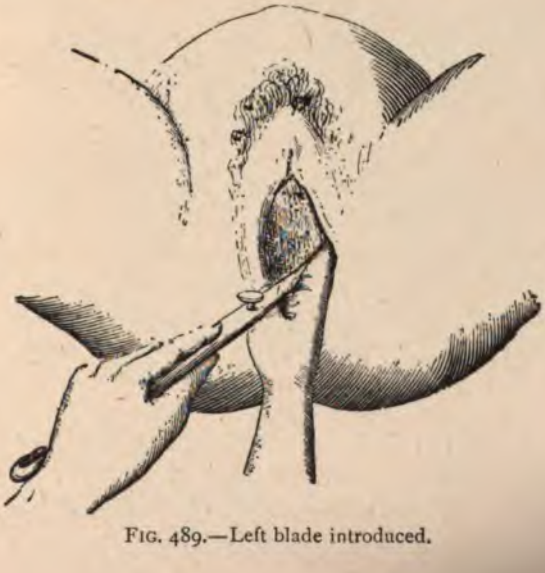


FIG. 489.—Left blade introduced.

Such are the rules for the introduction of the forceps. Let us now put them into execution by taking, as an example, the most simple case, a vertex presentation in the occipito-pubic position, the head at the vulva.

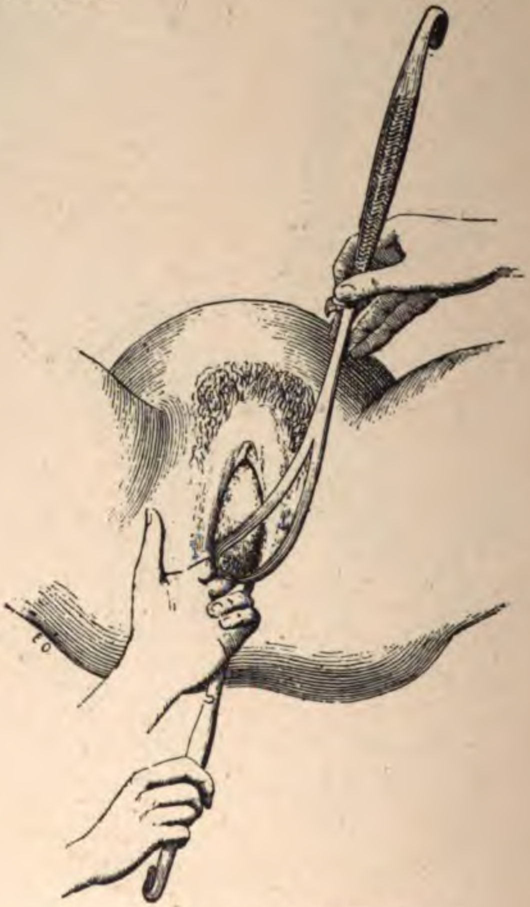


FIG. 490.—Introduction of the right blade.

Introduction of the left branch (Figs. 488, 489).—The left blade is held in the left hand as indicated in Fig. 488. Two fingers of the right hand are introduced at the lateral and inferior part of the vulva. (When the head is higher up it is better to introduce four fingers to seek the cervix and thus to avoid perforation of the culs-de-sac with the blades.) The instrument is made to penetrate backward and laterly, and brought gently to the side of the head in the position it should occupy definitely (Fig. 489).

Introduction of the right branch (Figs. 490, 491).—The right branch is held in the right hand, the left hand serving to guide the blade, and introduced into the genital organs above the branch already placed.

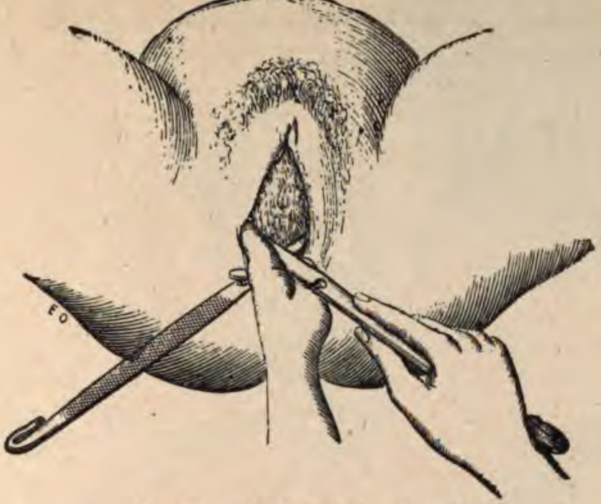


FIG. 491.—Right blade introduced.

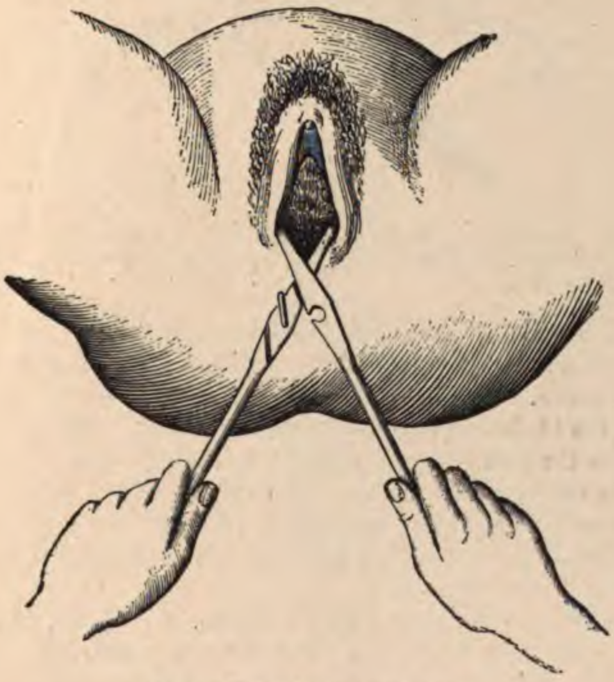


FIG. 492.—Articulation- Locking.

SECOND STAGE.—To proceed to articulation, that is to say, to locking of the two blades (Fig. 492), each handle is grasped and after crossing, if necessary, parallelism of the branches is established.

3. *The tricurved forceps.*—The most complete forceps of this class was that produced by Tarnier, in 1877. In a general way it resembles that of Levret, but differs in three principal points (Figs. 483 and 484):

1. By the presence of a pressure screw, placed at the side of the articulation, to supplement the action of the hands in keeping the handles together;

2. By the addition of two movable rods, destined to transmit the traction;

3. By a traction handle fitted to the preceeding, and designing the perinæal curve.

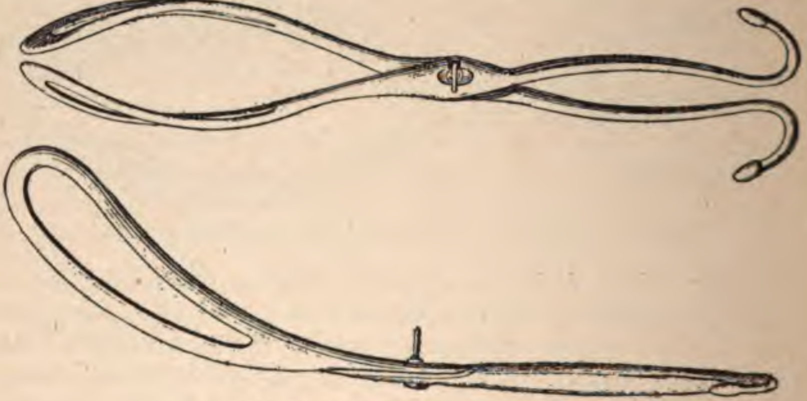


FIG. 482.—Bicurved forceps (Levret).

From this disposition, the tricurved forceps presents the following advantages:

1. It permits traction in the axis of the genital canal.

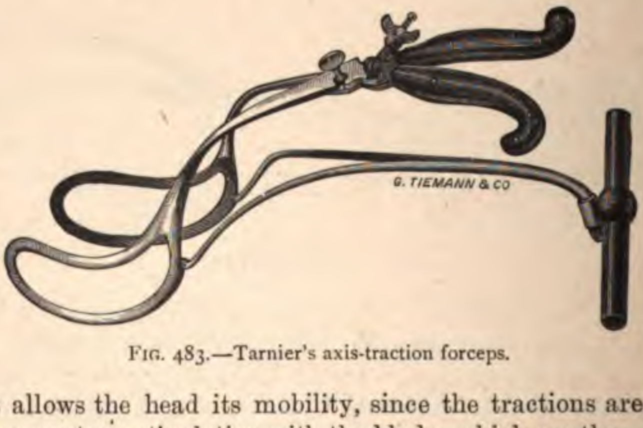


FIG. 483.—Tarnier's axis-traction forceps.

2. It allows the head its mobility, since the tractions are made by an apparatus articulating with the blades which are thus left to themselves, after fixation with the pressure screw.

to give a movement of extention to the cephalic extremity. The thumb of the other hand is applied on the perinæum, supporting the fœtal head and moderating the rapidity of the exit, so as to avoid laceration.

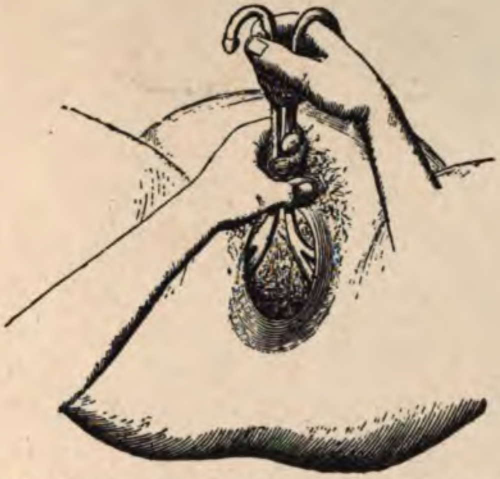


FIG. 494.—Extraction. Arrival of the head at the vulvar orifice.

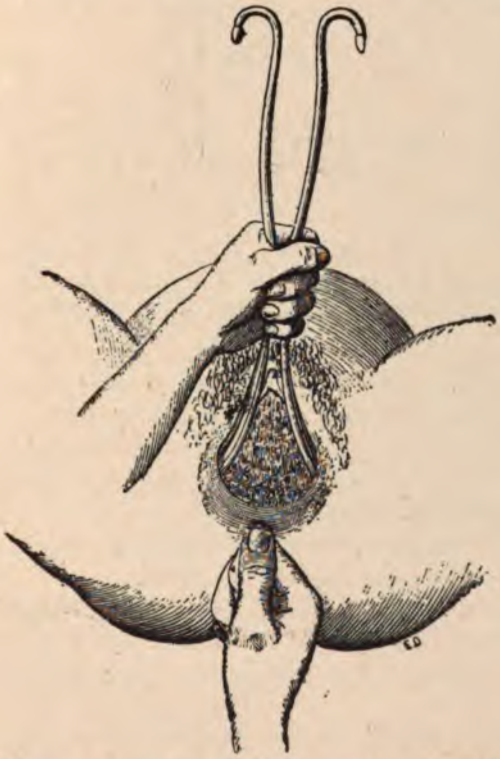


FIG. 495.—Extraction. The head opens the vulvar orifice.

1. Maternal rule.

Right branch, grasped with the right hand, introduced to the right of the woman.

Left branch, grasped with the left hand, introduced to left of the woman.

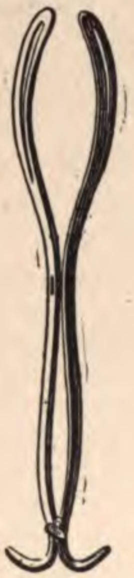


FIG. 485.
Porallel unicurved forceps (Thenance, 1781).

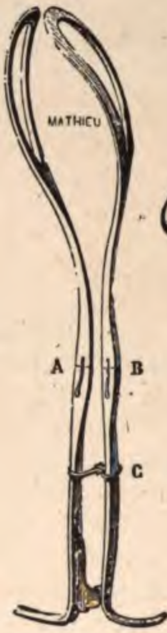


FIG. 486.
Parallel bicurved forceps (Valette, 1857).

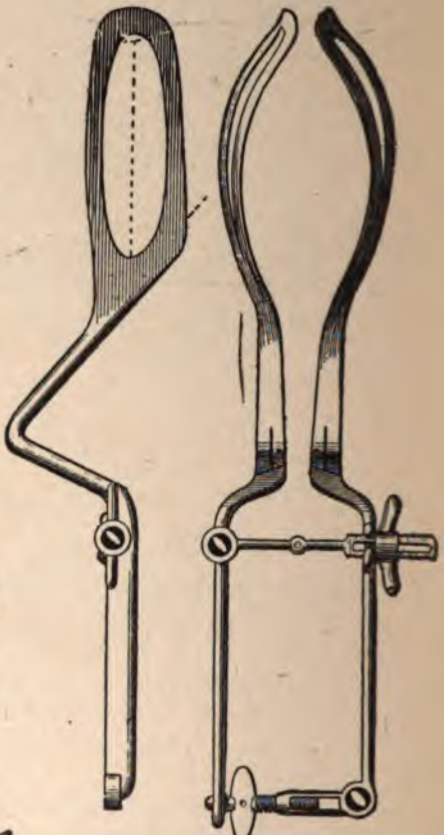


FIG. 487.
Parallel tricurved forceps (Poullet).

2. Fœtal rule.

The child should be grasped from one ear to the other. If there is a presentation of the cephalic ovoid the diameter grasped should be:

The biparietal for the vertex;
The bimalar for the face;
The bitemporal for the brow.

In cases of breech presentation the bitrochanteric diameter will be chosen.

3. Instrumental rule.

The left branch is always to be applied first, thus avoiding crossing the handles in articulating.

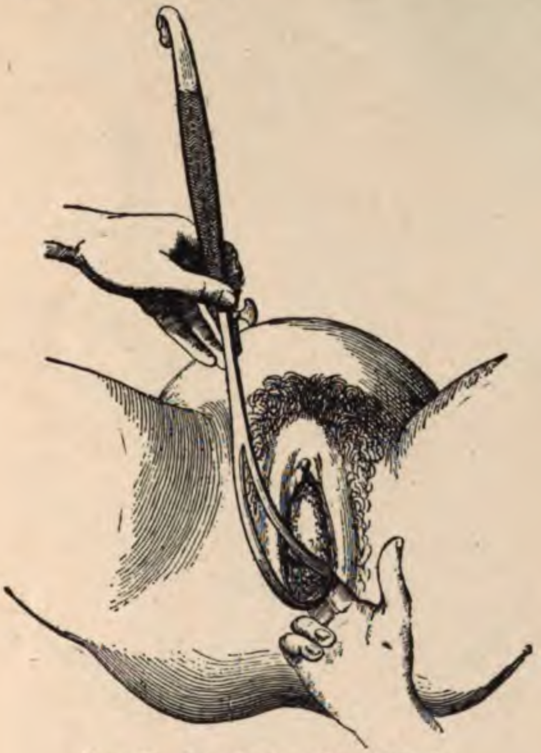


FIG. 488.—Introduction of the left blade.

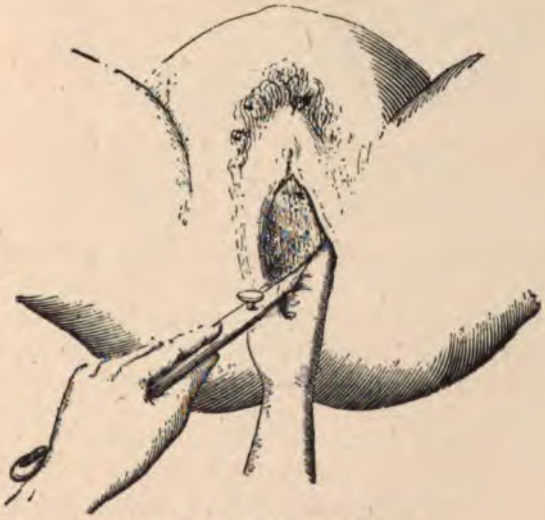


FIG. 489.—Left blade introduced.

the blades, and the prevention of the oscillation of this diameter during descent through a contracted superior strait. Thus the two other methods of seizure are preferable. As a rule the occipito-facial should be used, and in case it fails the parieto-facial method should be attempted, the biparietal seizure being reserved for relatively rare cases and for a special form of pelvis.

L O I T.—The left blade to the occiput, the right on the face. The head is made to descend into the excavation in the transverse position; it is placed in O P at the median strait, and from this moment, according to the suppleness of the soft tissues, the extraction is terminated by leaving the forceps in position or by reapplying the blades to grasp the biparietal diameter.

R O I T.—Left blade on the face; right blade on the occiput. The head is made to descend into the excavation in the transverse position. The occiput is then brought forward and extraction terminated as in L O I T.

II. *Face.*

1. *Soft pelvis.*—Direct application.

M P.—Same application as in O P. Extraction conforming to the normal mechanism.

M S.—Same application as for M P. In extraction the chin must be brought forward.

2. *Excavation.*—Oblique application. All that has been said apropos of vertex presentation applies here, with the difference that it is always necessary to bring the chin forward.

3. *Superior strait.*—Transverse application. When the head in face presentations is still at the level of the superior strait, it is much better to use podalic version, or reduction of the face into vertex, followed by application of the forceps, if necessary.

However, if in these conditions it is desired to apply the forceps, it will be preferable to apply the blade of the forceps on the bimalar diameter; but this intervention is not to be advised.

III. *Brow.*

1. *Soft pelvis.*—Direct application. The forceps may be applied from one ear to the other and the head extracted directly by imitating the mechanism of a normal exit as much as possible.

2. *Excavation.*—Oblique application. Apply the forceps as in an analogous presentation of the vertex, after having attempted transformation into a vertex.

3. *Superior strait.*—Transverse application. Attempt transformation into vertex or internal podalic version, if the conditions are favorable; if not, apply the forceps as if in presentation of the vertex and make extraction by bringing the occiput forward.

IV. *Breech.*

The forceps will only be indicated in presentation of the breech, variety of the buttocks; in all other cases the feet will be seized and manual extraction performed by preference.

To apply the forceps on the breech, grasp the bitrochanteric diameter and perform extraction by imitating the normal mechanism of accouchement.

V. *Head last.*

The after-coming head may be retained:

By the bony pelvis;

By the cervico-uterine segment;

By the soft pelvis.

In the first case the forceps is a bad method of extraction; the hand is preferable.

In the second case, the forceps is relatively better, but manual extraction is more certain.

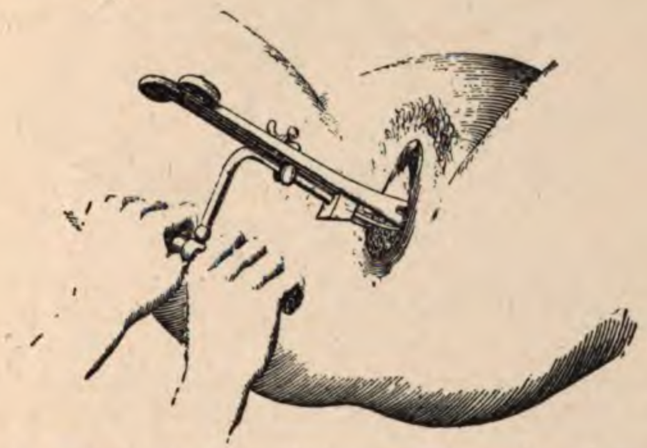


FIG. 499.—Extraction with the tricurved forceps. Arrival of the head at the vulvar orifice.

In the third case, where the hands are insufficient the forceps is a valuable resource of extraction. To apply the instrument in such a case, it is sufficient, after having brought the occiput forward, to have the child's body uplifted by an assistant and to glide each one of the blades on to the lateral parts of the cephalic extremity, as in head first. Disengagement is performed by giving the fœtal part a hinge movement around the lower part of the symphysis pubis, the occipito-cervical groove remaining in contact with the maternal pubis.

2. *Tricurved forceps.*—The introduction of the blades is made according to the same principles as for the bicurved forceps.

Articulation should be completed by the fixation of the pressure screw and adaptation of the traction handle and rods.

Extraction takes place simply by grasping the traction apparatus, leaving free the forceps handles as an indicator. It is necessary to exercise traction (Fig. 499) in such a way that between the handles of prehension and the traction handle there will be an interval of about a finger's breadth.

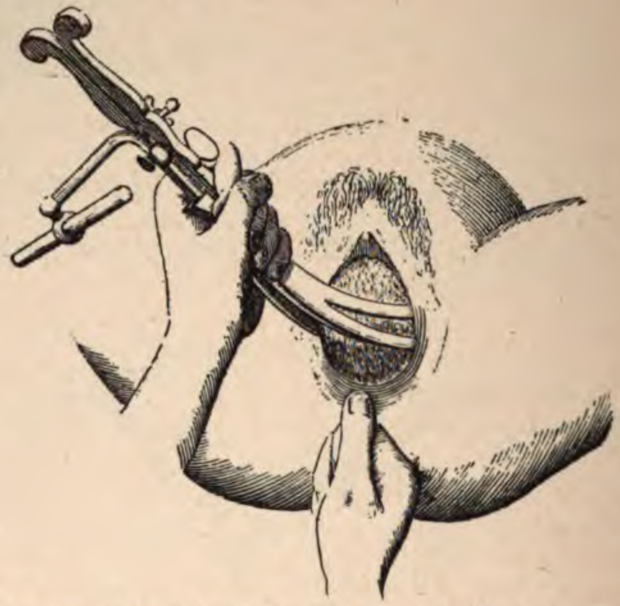


FIG. 500.—Extraction with the tricurved forceps. The head opens the vulvar orifice.

At the moment when the head opens the vulva, the forceps are grasped with the left hand (Fig. 500) while the right supports the perinæum.

To accomplish rotation with the axis traction-forceps, one hand should hold the traction apparatus while the other gives a turning movement to the handles, causing them to describe a rotation around the traction rods as a center.

CHAPTER XXXI.

MANUAL EXTRACTION.

When the fœtus presents by the breech the obstetrician may, by grasping the pelvic members with the hand, practice extraction in the same way as with the forceps in a presentation of the cephalic ovoid. Thus, besides extraction by the forceps, there exists manual extraction, which must not be confounded with podalic version.

In preparing for manual extraction the patient should be placed in the obstetrical position as for the forceps and internal version. Anæsthesia is used or not according to the woman and to the assistants at disposal.

The operation is performed in three stages:

1. Grasping the feet.
2. Extraction of the trunk.
3. Extraction of the head.

First stage.—The right hand is introduced into the genital organs to grasp, according to the facility, one foot alone or both feet. If extraction succeeds to internal version, this first stage is found already executed.

Second stage.—During the whole of the extraction an assistant supports the fundus of the uterus and compresses it with both hands.

Lower limbs (Fig. 506).—The limbs are grasped with both hands and drawn strongly downward in the supposed direction of the axis of the superior strait.

Breech (Fig. 507).—As soon as the breech appears at the vulva, it is grasped with both hands, covering it with a cloth, at need, to prevent slipping. The tractions are continued.

Abdomen (Fig. 508).—The abdomen is disengaged without removing the hands from the breech. It should never be grasped with the hand on account of the lesions that might be thus produced. As soon as the cord becomes visible, its placental extremity should be drawn out to constitute a loop that will avoid the dragging to which it will be exposed without this precaution.

Thorax.—The tractions on the breech are continued, directing the vertebral column toward the middle of the ischio-pubic ramus in such a manner that the head on arriving in the excavation is placed easily and naturally in the O P.

Third stage.—When the head is small, well flexed, the genital passage large and supple, and when the abdominal expression has

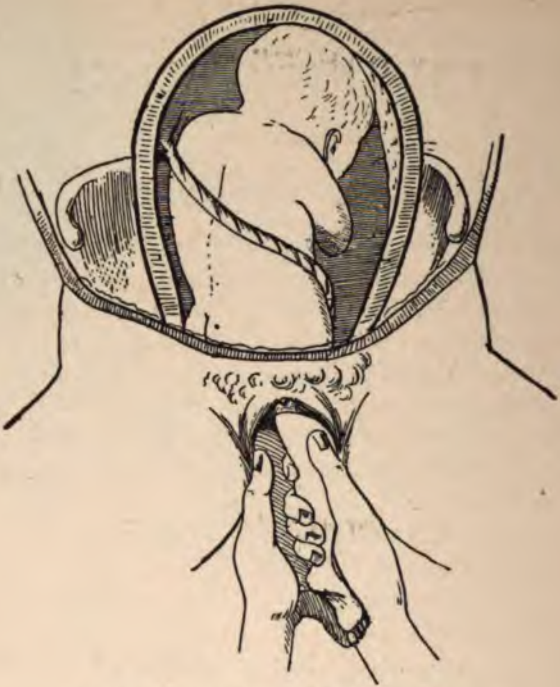


Fig. 506.—Grasping the inferior members.

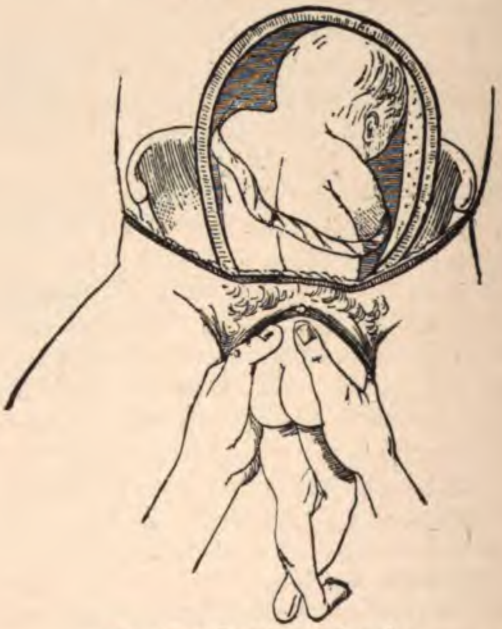


Fig. 507.—Grasping the breech.

been well made, it sometimes happens that the cephalic ovoid, after the expulsion of the shoulders, makes a sudden exit from the genital organs, as if ejaculated.

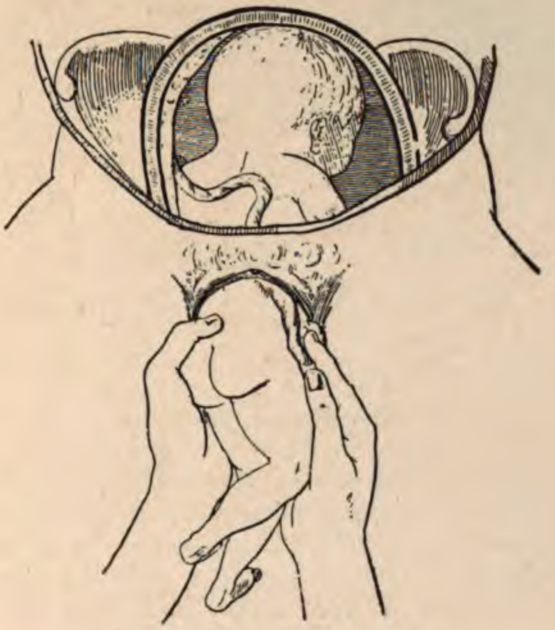


FIG. 508.—Liberation of the cord.

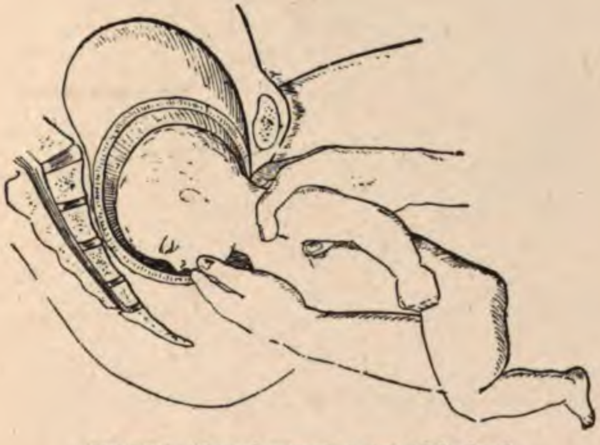


FIG. 509.—Manual extraction, exit of the head.

But usually it becomes necessary to assist its exit by introducing one or two fingers in the child's mouth, placing the other hand on the neck (Fig. 509). The tractions made by the two hands thus placed should flex the head and give it a hinge movement around the occipito-cervical groove placed under the maternal pubes.

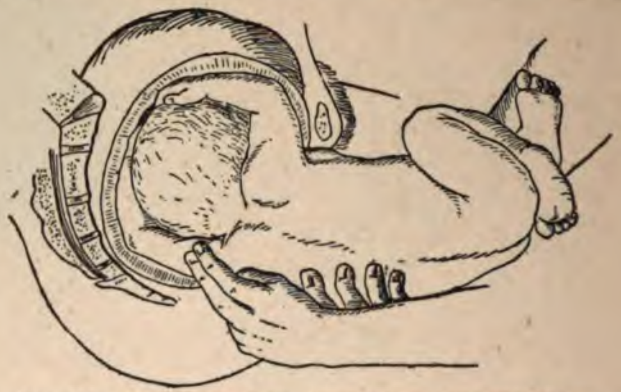


FIG. 510.—Manual extraction, drawing down the posterior arm.

There may also be difficulties in extraction caused by uplifted arms. In this complication, drawing on the child in the hope of seeing the head and arms expelled simultaneously must be guarded against. If this is done, extraction will become impossible except with a relatively small child. It is necessary to draw the arms down successively, in a different manner, according as the head has arrived at the median strait or is still retained at the superior strait.

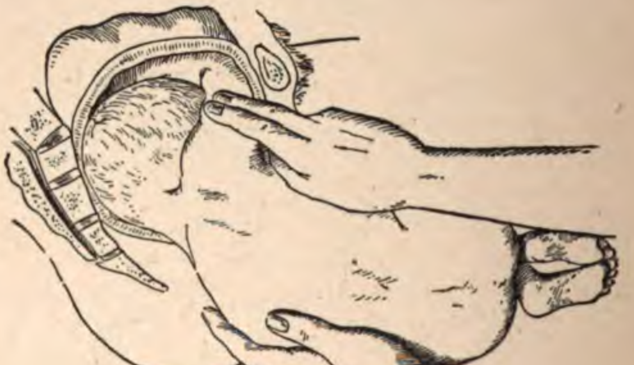


FIG. 511.—Manual extraction, drawing down the anterior arm.

1. *Head at the median strait.*—Commence by disengagement of the posterior arm (Fig. 510). After strongly uplifting the child the fingers are introduced into the vagina to grasp the arm. Placing the fingers parallel to the humerus the arm is drawn down by making it follow the inverse movement of raising it up (Fig. 511).

2. *Head at the superior strait.*—When the head is retained at the superior strait, by a contracted pelvis for example, it is necessary to proceed to the same successive disengagement of each arm, but here, in place of beginning with the posterior shoulder, it is better to extract the anterior first, for it is only separated from the hand by the height of the pubes, while the posterior shoulder being found at the promontory it would be necessary to follow the perinæum, the coccyx and the sacrum.

CHAPTER XXXII.

INDUCED EXPULSION.

Premature expulsion should be performed:

1. When there is a disproportion between the parturient canal and the fœtus. Causes: Pelvic deformity, excess of volume of the fœtus, or both combined.

2. When there are indications, other than these, furnished by the mother or by the fœtus.

Mother —

Any grave condition capable of being modified for the better by the interruption of pregnancy becomes an indication for induced expulsion. Such are:

Incoercible vomiting.

Grave or pernicious anæmia.

Any grave disease of the lungs (asphyxia), of the heart (asystole), or of the kidneys, menacing the existence of the woman and capable of being relieved by the expulsion of the ovum.

Fœtus.—

The fœtal indication is furnished by that pathological state which we have studied under the term habitual death. In such cases we are authorized to induce premature labor to save the child. This indication disappears if the death precedes the last three months of pregnancy.

Contraindications.—The contraindications are three in number.

1. The death of the fœtus.

2. The grave condition of the mother, capable of fatal termination under induced expulsion. If the operation is to save the child,

being given the imminent death of the mother, it is better to wait a favorable moment for Cæsarian section.

3. The formal will of the mother, who, in full possession of her faculties, desires to save the child by going to term and submitting to a Cæsarian section.

The different methods which have been proposed for the induction of premature expulsion may be classed in the following manner:

I. *Indirect methods.*—

- 1. Internal.
  - 1. Ancient authorities, rue, yeu, sabina.
  - 2. Bongiovanni, ergot.
  - 3. Sayre, sulphate of quinine.
  - 4. Mari-Autet, pilocarpine hydrochlorate.
- 2. External.
  - 1. D'outrepont, uterine frictions, massage.
  - 2. Schreiber, Simpson, faradization.
  - 3. Gardien, repeated hot baths.
  - 4. Friedreich, Scanzoni, sinapisms, cups to the breasts.

II. *Direct methods.*—

- 1. On the cervix.
  - 1. Schoeller, vaginal tampon.
  - 2. Huter, Braun, colpeurynter.
  - 3. Kiwish, douches to the cervix.
- 2. In the cervix.
  - 1. Kluge, prepared sponge.
  - 2. Van Leynseele, laminaria.
  - 3. Barnes, Chassagny, rubber sac.
- 3. In the uterus:
  - *a.* Non-dilatable body.
    - 1. Krause, elastic sound.
    - 2. Schweighauser, utero-ovuline injection.
    - 3. Hamilton, detachment of the membranes with the finger.
  - *b.* Dilatable body.
    - 1. Tarnier, rubber bag.
    - 2. Pajot, Tarnier's dilator modified.
    - 3. Champetier de Ribes, inextensible bag.
- 4. In the ovum.
  - 1. Scheel, trocar (perforation of the membranes at the cervix).
  - 2. Meissner, trocar (perforation of the membranes at a point distant from the cervix).

Among these numerous methods, the three best procedures for inducing premature expulsion of the ovum are, the perforation of the membranes and the introduction into the uterus of a dilatable or a non-dilatable body.

Perforation of the membrane has the disadvantage of depriving the fœtus of a part of its amniotic liquid and thus of exposing in a greater degree to the dangers of accouchement. Therefore, unless it relates to abortion, where the life of the child is indifferent, it is better to give the preference to one of the two methods which follow:

The introduction of a dilatable body is happily realized by Tarnier's rubber bag, carried into the uterus by the aid of a special instrument; but this apparatus is quite complicated, the bag sometimes bursts, an accident necessitating the introduction of a new dilator. Ribes has recently advised a dilator of inextensible tissue, that is, dilatable only to a certain extent; this dilator has the advantage of promptly inducing labor and of causing a rapid opening of the cervix, but the relative difficulty of its introduction into the uterus, the dangers of the vicious presentations to which it exposes and, finally, the frequent procidence of the cord as a consequence of its introduction, will prevent its coming into common use.

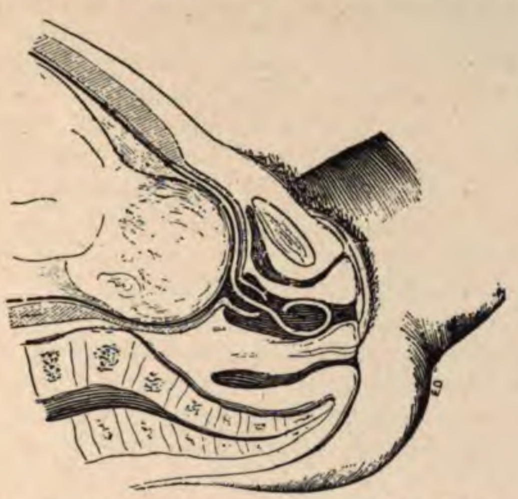


FIG. 512.—Sound introduced into the uterus and folded in the vagina (Krause's procedure).

Introduction of a non-dilatable body.—The most simple and the best procedure is that advised by Krause, which consists of introducing a simple sound or elastic bougie into the uterus (Fig. 512). The two accidents that may be observed during the introduction of the instrument are, perforation of the membrane and a hæmorrhage proceding from a traumatic detachment of the placenta.

The first is a simple annoyance; the second may be left or be withdrawn, as expulsion will be induced by the perforation of the membranes. The hæmorrhage resulting from a placental detachment is a more serious complication; it is necessary to withdraw the instrument and to attempt its introduction in a new direction. If the flow of blood continues or takes serious proportions it may become necessary to apply the treatment advised for placenta prævia.

The bougie demands watching, for under the influence of uterine contractions it is sometimes expelled into the vagina and needs to be introduced again.

CHAPTER XXXIII.

EMBRYOTOMY.

When the fœtus is too voluminous to pass through the parturient canal it becomes necessary, unless we resort to Cæsarian section, to extract it by reducing it at the sacrifice of its existence. This operation is called embryotomy.

According as the fœtus presents by the head or by the trunk, the reduction will relate to one or the other part; we have, then, two varieties of embryotomy:

Cephalic embryotomy, reduction of the head.

Cormic embryotomy, reduction of the trunk.

The trunk, like the head, is composed of viscera enclosed in a more or less resisting wall. Now, embryotomy is sometimes addressed to one, sometimes to both, of these two elements—viscera and wall. In this point of view there are also two varieties of embryotomy:

Visceral embryotomy.

Parietal embryotomy.

Visceral embryotomy consists, for the cephalic ovoid, in the evacuation, after perforation of the cranium, of the cerebral substance, and for the cormic ovoid, in tearing away the viscera occupying the thoracic and abdominal cavities after perforation. In both cases it is an evisceration differing only by the organs to which it relates.

Parietal embryotomy for both ovoids, consists in reduction of the size in four different ways:

By compression—which is exerted on the eviscerated ovoid by the forceps or by an analogous instrument.

By accommodation—when, for example, with the aid of the cranioclast, a perforated head is drawn slowly, or when, after the section of the neck, each ovoid is extracted slowly by accommodating it to the genital passage.

By crushing—if the bones are broken, to lessen the resistance opposing the passage of the child.

Finally, by *morcellement*—when the body of the fœtus is extracted piece by piece.

These different modes of reduction are often combined under the action of one apparatus.

Numerous instruments have been proposed for the execution of these manœuvers, but at the present day those most in use are the cephalotribe, the cranioclast and the scissors.

Let us study successively the cephalic and the cormic embryotomies.

I. *Cephalic embryotomy.*—Cephalic embryotomy is composed, as has been indicated, of two successive operations: *eviseration*, which necessitates perforation of the cranium, and *reduction*.

Among the numerous visceral embryotomies or perforators that devised by Blot is the best (Fig. 513).

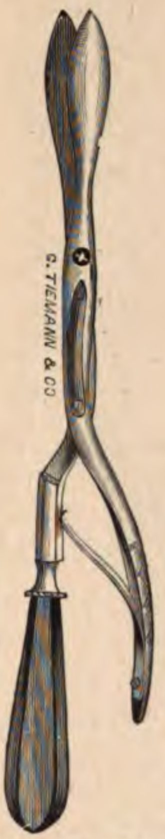


FIG. 513.—Blot's perforator.

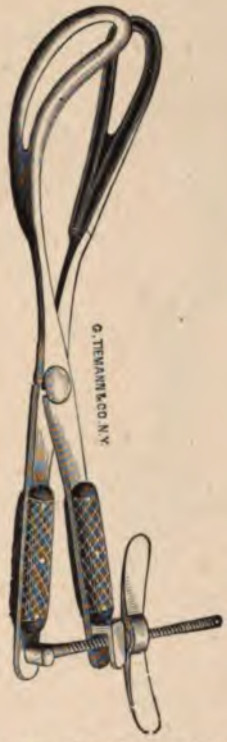


FIG. 514.—Lusk's cephalotribe.

The cephalic embryotomies par excellence are the cranial forceps, of which there are three varieties: The intra-cranial forceps, in which the two jaws, introduced through the perforation, grasp the base of the cranium. The extra-cranial forceps, or the cephalotribe (Fig. 514), in which the two jaws are applied to the periphery of the skull. The mixed variety of forceps, or the cranioclast (Fig.

515 and 516), in which one extremity is applied in the cranium, the other on the periphery.

The intra-cranial forceps is but little used.

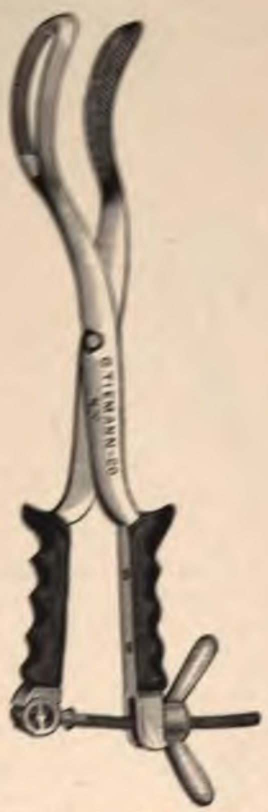


FIG. 515.—Braun's cranioclast.

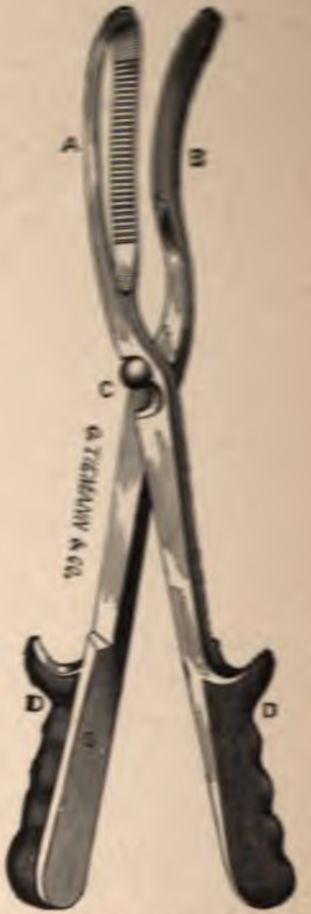


FIG. 516.—Simpson's cranioclast.

The cranioclast, however, has an extended employment in various models. The plain or the male blade is introduced into the cranium through a perforation previously made and the fenestrated branch, or female blade, is applied on the periphery, preferably on the face.

The cephalotribe is only a strong forceps furnished with a pressure screw for crushing. One of the best models is that of M. Bailly (Fig. 517). After the perforation of the cranium it is applied like the forceps and the head is crushed to the extent necessary to permit extraction.

In 1884 Tarnier modified this instrument, giving it the name of basiotribe (Fig. 518). Later, Bar perfected it by some modifications (Fig. 519). The basiotribe is composed of a central branch which serves as a perforator and of two lateral branches recalling those of the cephalotribe. The operation is commenced by the introduction of the perforating branch and then the two lateral blades are placed and the crushing is successively executed with each one of them.

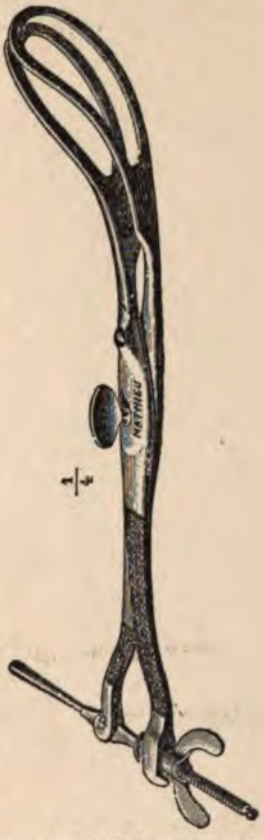


FIG. 517.—Bailly's cephalotribe.

Combined forceps.—Combined cephalic embryotomy.—The cephalotribe constitutes an excellent crushing instrument. On the other hand, the cranioclast has no rival so far as solidity is concerned. These two instruments are then indispensable to the accoucheur. But by adding a third branch to the cephalotribe I have designed an instrument which may be employed as a cranioclast at need, and which by the addition of this third branch affords all the services of the cephalotribe or of the basiotribe. To practice cephalic embryotomy with this instrument we proceed as follows: The woman being anæsthetized and placed in the obstetrical p an assistant is instructed to maintain the head firmly one hand on each side of the hypogastrium. Guiding it on the left hand, the perforator is introduced and by a gimlet it is sunk into the most accessible part of the cephalic ovoid. When this branch has penetrated the cranium it is pushed in different directions to dissociate the cerebral substance. The point of the instrument is directed as much as possible toward the occipital foramen. An assistant is charged with maintaining this branch supported on the base of the skull; the curve of the instrument (marked on the handle) is turned toward the left side, that is, toward the blade that is next applied. The left branch is then introduced and applied like the blade of the forceps on the fœtal head. When this is accomplished, the branch will be maintained by a hook at the handle. Thus applied (Figs. 523, 524, 525) the combined cephalic embryotome is only an ordinary cranioclast and can be employed as such if its action is judged sufficient. But if it is deemed necessary to complete the crushing, the right blade is applied like the right blade of the forceps and articulated. Then crushing can be performed by the

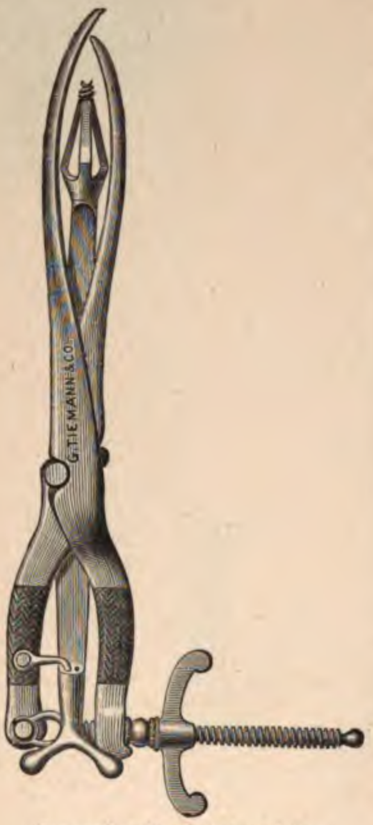


FIG. 518.—Tarnier's basiotribe.

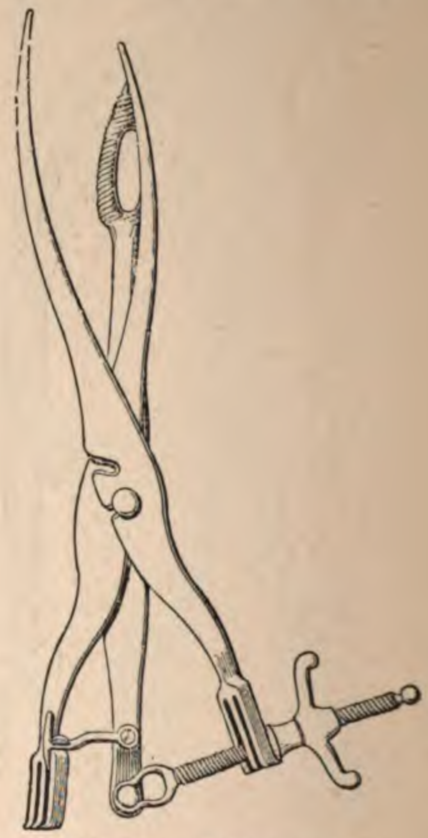


FIG. 519.—Bar's cephalotribe.

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use of the screw. As soon as this is completed the right branch, like the left branch, as we have already seen, is held by a hook (Fig. 526) so that the pressure screw can be removed and extraction performed.

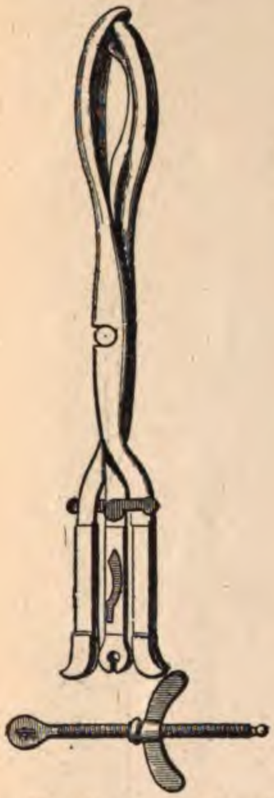

FIG. 520.—Combined cephalic embryotome.

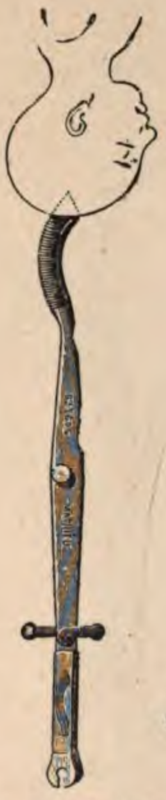

FIG. 521.—Perforation of the cranium.

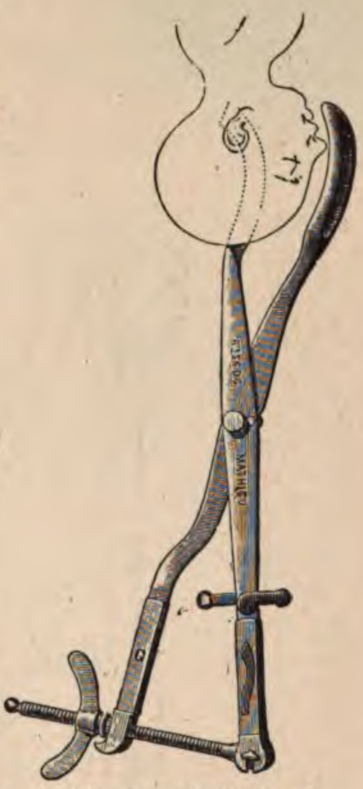

FIG. 522.—Application of the left blade.

II. *Cormic embryotomy.*—As for the cephalic ovoid, we are here in the presence of two distinct operations, evisceration and reduction.

For cormic embryotomy there are numerous instruments, but among these Dubois' scissors (Fig. 527) is sufficient to perform all the varieties of cormic embryotomy, and on this subject I shall be confined to indicating their employment in:

1. Evisceration.
2. Decollation.
3. Rachitomy.
4. Melotomy.
5. Morcellement.

1. *Evisceration (presentation of the abdomen).*—The left hand being introduced as far as the fœtal part which presents, by the use of

the scissors guided on this hand the abdominal wall is opened and through this opening, enlarged by the fingers, the abdominal and thoracic organs are torn out so as to empty these cavities of their contents. This evacuation generally permits termination of the extraction by internal podalic version without difficulty.

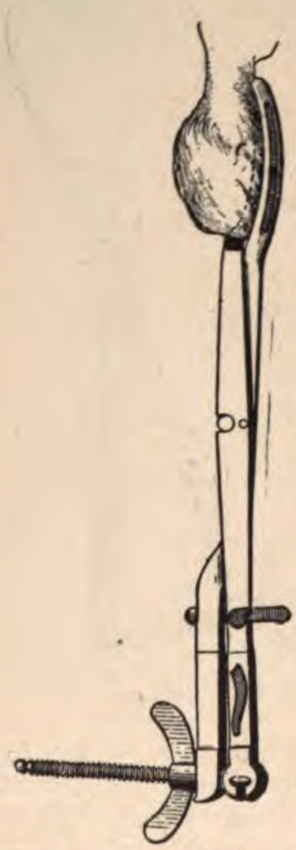

FIG. 523.—First crushing.

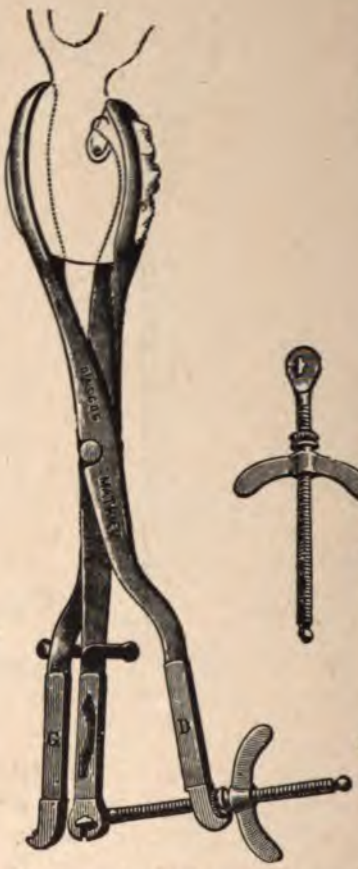

FIG. 524.—Application of the right blade.

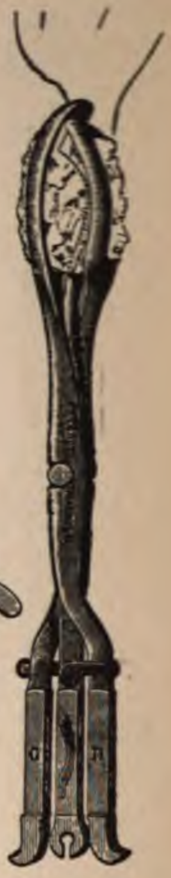

FIG. 525.—Second crushing. Instrument applied.

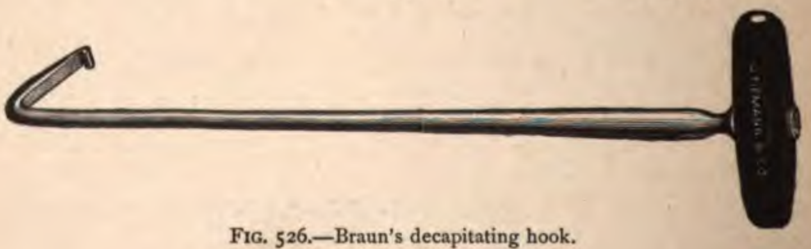

FIG. 526.—Braun's decapitating hook.

2. *Decollation* (*presentation of the thorax*).—The fœtus presenting by the thorax and version becoming impossible, it is necessary in order to terminate the accouchement to decapitate the fœtus, so as to extract successively the trunk and then the head. For this section a hand, preferably the left, is introduced to grasp the neck and draw it down as much as possible. The neck being thus held, the scissors are used with the free hand and the head severed by small cuts (Fig. 528). As soon as the section is completed, and

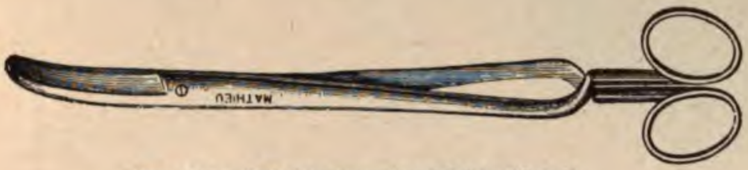

FIG. 527.—Dubois' scisors (modified by Pinard).

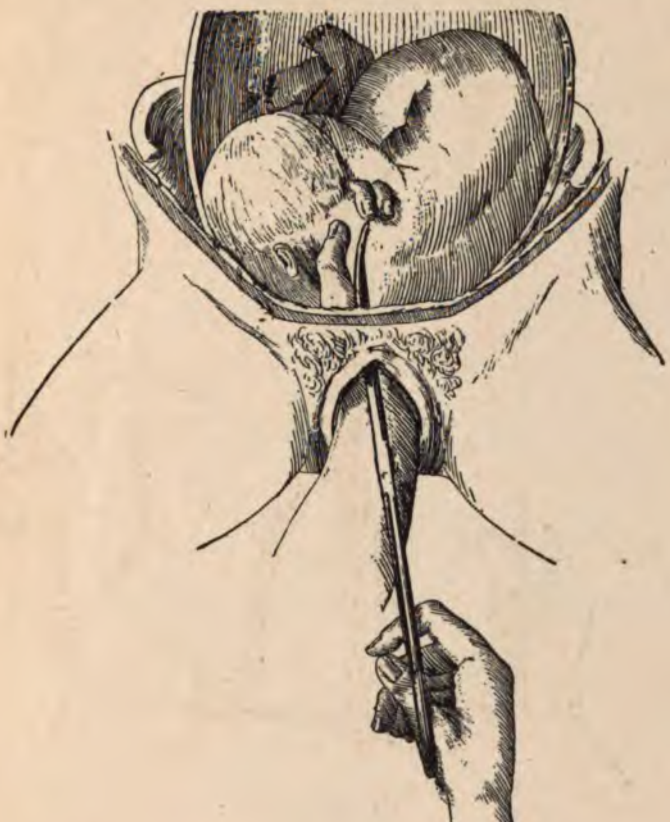

FIG. 528.—Section of the neck, with Dubois' scisors.

care has been taken to tear loose the remaining soft parts, one of the arms is seized and the cormic ovoid extracted (Fig. 529). To

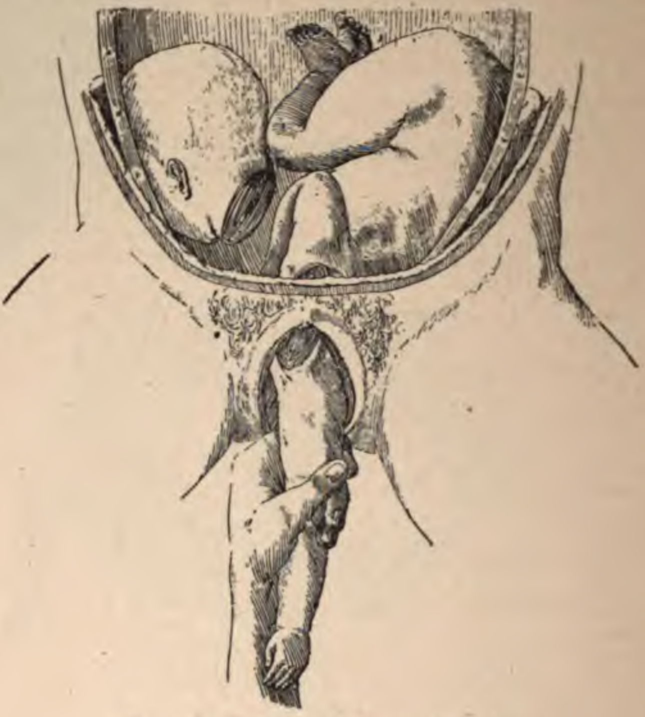

FIG. 529.—Extraction of the cormic ovoid.

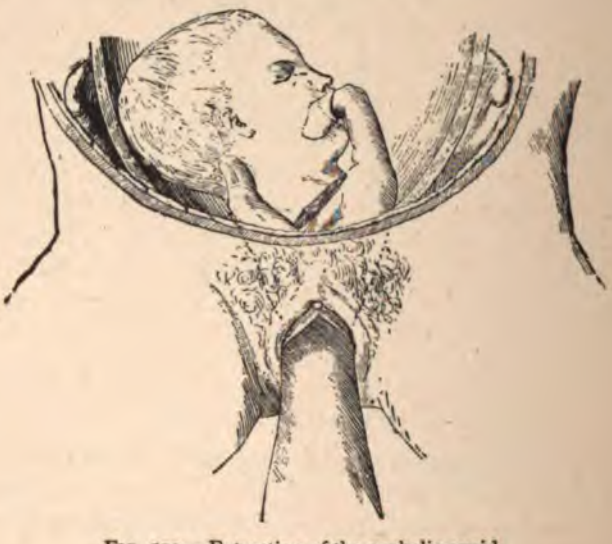

FIG. 530.—Extraction of the cephalic ovoid.

extract the head, which remains alone in the genital organs, a finger is hooked on to the inferior maxillary through the mouth and this generally serves for extraction (Fig. 530); if not, the forceps are used, or even, if reduction is necessary, the cephalic embryotome.

3. *Rachitomy.*—If section of the spinal column is necessary it is accomplished by the scissors guided by a hand introduced into the genital organs.

4. *Melotomy.*—Section of the limbs, when necessary, may also be made with Dubois' scissors guided to the parts to be divided by a hand in the genital passage.

5. *Morcellement* consists in extracting the fœtus in fragments. Dubois' scissors will permit this detachment in portions.

CHAPTER XXXIV.

HYSTEROTOMY.—CÆSARIAN SECTION.

Hysterotomy, or the Cæsarian operation, consists in opening the abdominal and uterine walls with a knife, in extracting the fœtus and its appendages through this artificial passage, and subsequent closing of the abdominal wall and the uterine wound by sutures. Under the impulse given to classic hysterotomy by Sænger's modifications Cæsarian section, as practiced at the present time, gives results much superior to Porro's operation. In the ulterior course of this description, then, I shall have exclusively in view classic hysterotomy, only incidentally speaking of Porro's operation.

Preliminary precautions.

Moment to choose for the operation.—It seems preferable not to wait for the beginning of labor, but to choose the last days of pregnancy before the appearance of the pains. In this way all the preparations may be made with great care and all the conditions favorable to success are more easily united. It has been objected that this period exposes to uterine inertia, but this objection has not been proven and is not probable, for the uterus is equally retractile at all the periods of the puerperal state.

Necessary instruments.—Ordinary and probe-pointed knives, dissecting forceps, a dozen hæmostatic forceps, scissors, Reverdin's needle, ordinary needles and a needle-holder, silk thread of two sizes, hot and cold antiseptic solutions, soap, brush and razor for the antisepsis of the abdominal wall, ether, a dozen antiseptic towels, iodoform gauze in strips and in squares, iodoform in powder, a dozen sponges, six large and six small, antiseptic cotton, bandage, obstetrical forceps, solution of ergotine and a hypodermic syringe.

Anæsthesia should be made with chloroform.

Assistants.—One for anæsthesia, one for the abdomen, one for the instruments and one to receive the child. Two others for emergencies.

Various precautions.—Vulvo-vaginal antisepsis for four or five days before the operation. One or two baths during the two or three days previous to the intervention. Laxative the evening before the operation.

Before operating, while anæsthesia is being made, catheterism of the bladder. Shave all the subumbilical region, terminating this by washing with ether. Wrap up the lower limbs and the thorax to prevent chilling.

Operation.—The operation is performed in three stages:

a. Penetration to the ovum.

1. Incision of the abdominal wall.
2. Incision of the uterine wall.

b. Extraction of the ovum.

3. Extraction of the child.
4. Extraction of the appendages.

c. Sutures.

5. Sutures of the uterus.
6. Sutures of the abdominal wall.

1. *Incision of the abdominal wall.*—Incision of fifteen centimetres on the median line, starting four fingers' breadth above the symphysis pubis and passing around the umbilicus, preferably to the left to avoid the suspensory ligament of the liver (Fig. 531).

2. *Incision of the uterine wall.* — The uterus being laid bare, it is brought up and maintained in the median line; the assistant is directed to apply the abdominal wall firmly on the organ to avoid the escape of the liquor amnii into the peritonæal cavity. On the median line, parallel to the abdominal incision, the uterus is punctured with the knife at a point where palpation cannot detect any fœtal part. Into the button-hole thus created, the finger is introduced to serve as a guide for the incision of the uterine wall.

3. *Extraction of the child* (Fig. 532).—At the opening thus created, through which the liquor amnii escapes in abundance, or a fœtal part, head, breech, or intermediate part of the trunk quickly presents. Sometimes the retraction and the contraction of the

uterus are sufficiently energetic to push the fœtus into the artificial opening. It is then sufficient to aid this exit. If this does not occur extraction is performed, either by the aid of the forceps (if the head presents) or by the use of the hand (if the trunk presents). The cord is tied and cut and the child is immediately given to the person who is to receive it.

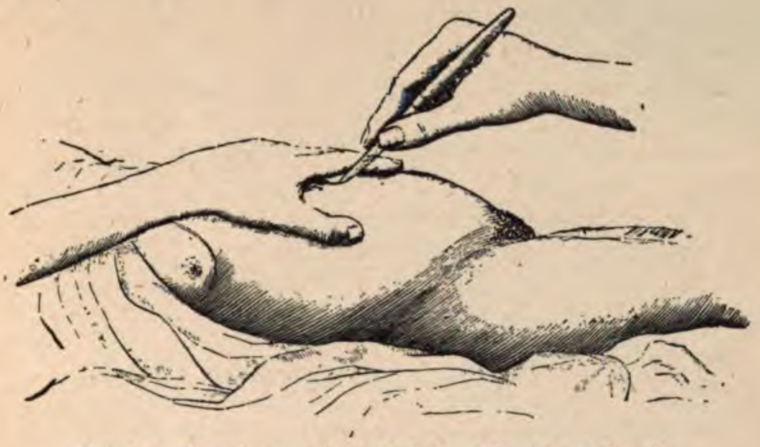

FIG. 531.—Cæsarian operation. Incision of the abdominal wall.

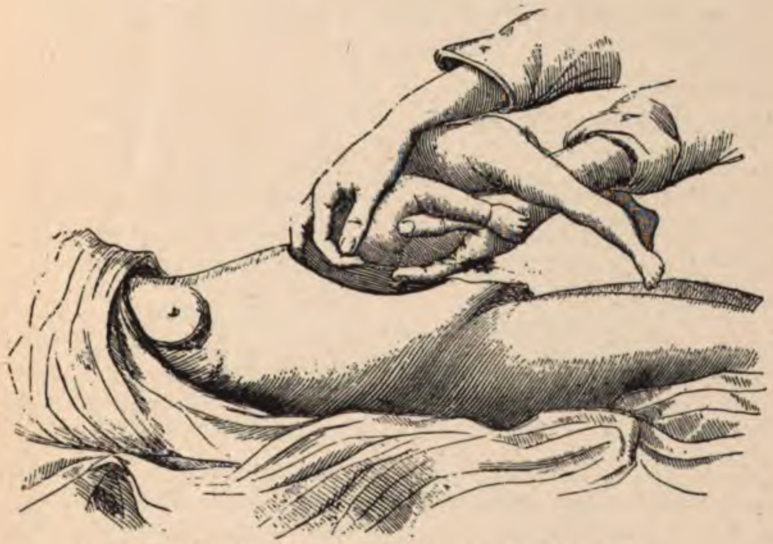

FIG. 532.—Cæsarian operation. Extraction of the child.

4. *Extraction of the appendages* (Fig. 533). — The right hand is passed at once into the uterus to seize the appendages, as in an artificial delivery of the appendages. The placenta and the membranes are brought out through the utero-abdominal opening.

5. *Sutures of the uterus* (Sanger).—After having carefully cleansed all the internal surface of the uterus and assuring the permeability of the cervical canal, the uterine wall is closed by the use of deep and of superficial sutures (of silk).

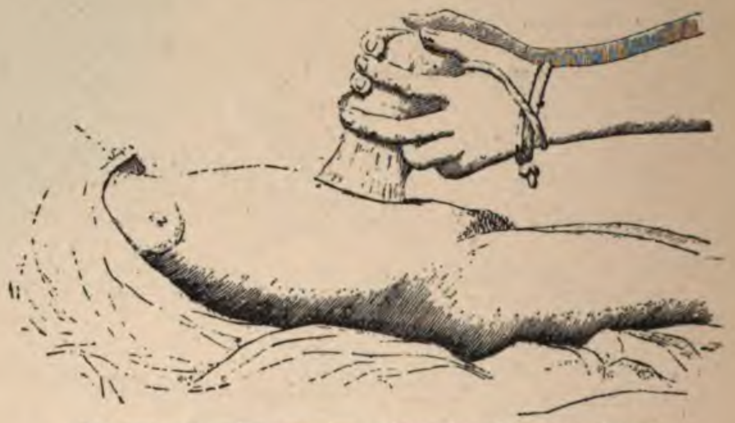

FIG. 533.—Cæsarian operation. Extraction of the appendages.

The deep sutures should be placed at one centimetre and one-half from each other, not including the uterine mucosa (Fig. 534), but passing at some millimetres above it to avoid any communication, by the intermediary of the threads, between the uterine and the peritonæal cavities.

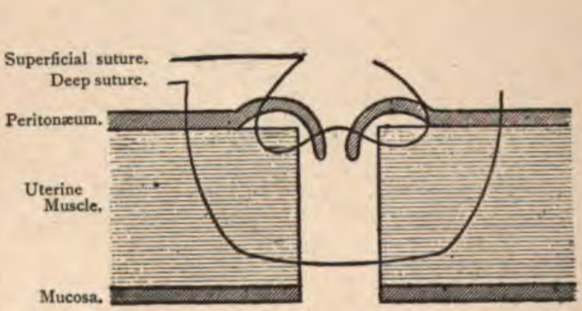

FIG. 534.—Sutures of the uterine wall, view of a section.

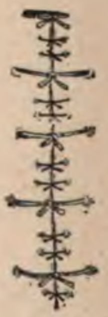

FIG. 535.—The same, seen from above after completion.

The superficial sutures should be placed one-half centimetre apart, two between each deep suture (Fig. 535). It is important to assure coaptation of the peritonæal lips. The sutures are placed so that the free edges of the peritonæum are fixed and maintained in the wound by the tension of the stitches.

6. *Sutures of the abdominal wall.*—Before proceeding to these sutures, it is necessary to make the toilet of the peritonæum by the use of aseptic sponges to collect all the liquids that have passed into

the serous cavity. The deep sutures, placed at one centimetre and a half from each other, should comprise the free edge of the peritonæum (Fig. 536). The superficial stitches are placed at one-half centimetre from each other (two between each deep suture) and do not require any special precaution (Fig. 537). Drainage is useless. A simple dressing of iodoform gauze, maintained by a bandage, is adapted. The consecutive treatment is analogous to that after a laparotomy.

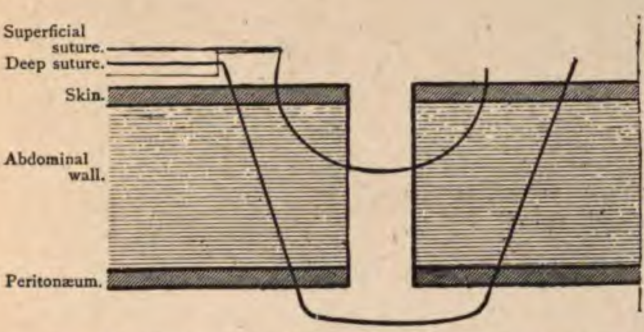

FIG. 536.—Sutures of the abdominal wall, view of a section.

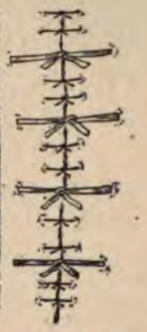

FIG. 537.—The same seen from above after completion.

Porro's operation consists in removing the body of the uterus. To this effect the body of the uterus being brought outside the abdomen it is transfixed at the union of the body and the cervix by two metallic pins. Above these pins is slipped a loop of wire to constrict the pedicle. For greater security it is better to place below the pins a second wire-loop. The uterus is excised at two centimetres above the constricting wire and the stump, thus constituted is fixed in the abdominal wound, which is closed as completely as possible by the use of ordinary sutures. The wire loop, the pins and the ligatures are removed at the end of a time which will vary with the rapidity of the pedicle and of the wound.

Porro's operation should be reserved for exceptionally grave cases and those where putrefaction of the ovum in the uterine cavity or a septic process causes fear that the uterus may be affected by septicæmia.

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